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ABSTRACT

The purpose of this research project was to analyze the act of questioning (i.e., the types of questions asked by teachers in class discussions) in order to discover possible patterns of inquiry exhibited by teachers. Each of the 30 participating elementary school teachers (randomly selected from the greater Wichita area) was asked to provide three 15-minute tape recordings of classroom discussions related to ongoing learning activities. One tape was requested early in the first semester, one at midsemester, and one near the end of the school year. Analysis of the resultant data, in terms of the kinds and frequency of teacher-initiated questions, yielded the following conclusions: "(1) that the individual teacher does exhibit a pattern in the kinds of questions she asks when the sample is drawn over a one-year period; (2) that there is no apparent general pattern exhibited by all teachers; (3) that there are some specific patterns exhibited by many teachers which are consistent throughout the year, such as opening discussion sessions with a convergent question and using a divergent question at discussion midpoint; and (4) that teachers used the inquiry for student opinion as their primary divergent activity." Appendixes include a graphic presentation of the tape analysis and the Questions Analyzer (the instrument designed to classify types of questions.) (Author/JS)

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FINAL REPORT

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INQUIRY PATTERNS IN ELEMENTARY TEACHING

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CHAPTER I

The Problem-Its Context

The proposal that we take an analytical view of the teaching act is met by some teachers as a threat to their domain while others approach the same suggestion with a great deal of interest and enthusiasm. For the educational researcher it holds the promise of developing a greater depth of understanding of the teacher's behavior while she is in the teaching arena. While providing a better conceptual view for the researcher in building more accurately toward the questions yet unanswered about the teaching-learning process, it can also afford immediate feedback to the teachers themselves.

In an active teaching situation, an attempt to recall the events of the teaching session, in an effort to answer questions directly related to the analysis of the teaching act, presents an almost impossible task. As teachers we tend to have a "feeling" about how our day went, we are encouraged or discouraged and very often our students are "enabled" or "disabled" learners.

There is a need for something more positive and direct than just a "feeling" about the teaching day and the transactions that took place during that day.

It would seem logical to focus on questions since it is one of the very basic and primary techniques used by the teacher to foster, encourage and evaluate learning. Yet, the questions asked by teachers is one of the areas with minimal research data available.

The growing trend in education seems to focus upon the problem solving facets of teaching, the development of creativity in the child, the critical thinking skills, to mention but a few of the areas receiving increased emphasis. It is readily apparent that the act of questioning by the teacher would play a vital role in the implementation of these as goals in the classroom.

The trend and research reveal a move from emphasis on the factual aspects of education to an emphasis upon the skills related to the thinking processes and their development.

This study proposes to focus on the inquiry aspects of the teaching act with special emphasis upon the questions as asked by the teacher during the discussion period.

Related Research

Research in the classroom has resulted in a critical look at many facets of the teaching process, some of this research has proven to be valuable, while other investigations provide little or no information of value. This is especially true in the area of inquiry for while there is some research it is extremely limited and not definitive in the development of a total picture.

Inquiry in Teaching

Objective descriptions of the dimensions of teacher behavior in the classroom have been recognized as a problem of major importance for many years. The practical problems of studying so complex an operation have tended to divert research from behavioral actions. As a result there was a tendency towards emphasis on the use of rating scales and "tests" to predict teaching success. A review of Doman and Tiedeman's study of the period from 1890 to 1949 indicated a preponderance of studies based on the judgments of supervisors, pupils, teachers and administrators. But very little was being done at that time to actually analyze the transactional processes that take place during the teaching act.

The earlier investigations centered around efforts to develop a criterion of teaching success. The central investigator for this general area was Barr (1935). In his efforts to develop a criterion of teaching success Barr used:

1. A composite of gains and test scores made by students during the experimental period of the Stanford achievement test.

> 2. A composite of ratings of the teachers made by the superintendents of schools with seven different rating scales twice applied.
>
> 3. A composite of scores made by teachers on nine measures of qualities associated with teaching.
>
> 4. A composite of all the foregoing measures, with validity of each of the nineteen instruments of measurement employed in this investigation was studied... In general, the values calculated were exceedingly low, most of them, when expressed in terms of co-efficient or correlations falling between zero and .35.

Barr indicated he felt the unsatisfactory results were due to errors in measurement on all variables and the minuteness of the contributions made by any one of the variables measured. He continued...

> In a manner we appear to fall into the same area in our measurement of teaching ability when we attempt to measure it through measures of the teacher's health, her intelligence, knowledge of subject matter, method, etc.

Probably what we need to do now is turn our attention to the development of functional tests measuring the teacher in action. (Barr, 1935)

A piece of research that could well be considered to be one of the fore-runners of interaction studies as well as the area of inquiry was produced by C.D. Jayne in 1945. The purpose of the study was to seek the relationship that existed between observable teacher activities and the changes produced in the pupils as measured by tests. Jayne's work was centered around the following activities:

1. Total number of questions
2. Number of question facts
3. Number of prepared thought questions
4. Total prepared questions
5. Answers repeated
6. Percentage of pupil's talk
7. Percentage of teacher's talk
8. *Recall of specific fact questions*
9. Prepared fact questions
10. Answers indicated to be right
11. Unprepared fact questions

The results of Jayne's studies were somewhat similar to Barr's. At the one percent level approximately six percent of the co-efficients were statistically significant. This would be approximately 20 out of 36 subjects. As a result Jayne drew the conclusion that there was little relationship between specific observable teacher acts and the pupil gain criterion.

Even though Jayne's work did not produce distinct relationships between observable teacher action and pupil gain, it did help to develop the area, for research purposes, of the observable action in the classroom.

Notable among the studies in this area was that of Withall (1948), who categorized teacher classroom statements and questions and derived a climate index. This index was developed to indicate the degree to which verbal behavior was "learner supportive" or "teacher supportive". The Withall instruments assessed the social emotional climate through the evaluation of teacher's statements, whereas the instrument used in this study is composed of assessments of the types of questions and their related patterns.

Work specifically in the area of classroom questions while limited in number does not exhibit much basic information. Moyer (1965) studied the following areas of inquiry:

1. Types of questions asked by teachers
2. Their structural forms
3. The functions of the questions asked
4. The relationship between structure and function
5. The teacher's development and utilization of questions, including the language in logical questions, the patterns in variations
6. Teacher's awareness of the questioning process

His major findings indicated that teachers tend to be consistent in the types of questions they ask as well as display distinguishable patterns of questioning in terms of structure, language, function and utilization. Moyer also found there was little relationship between the question function and the experience of the teacher as well as the fact that the number of questions asked and the percentage of responses received are not accurate signals the pupils are being challenged to think. (Moyer, 1965)

Based on his study he has suggested that an analysis of the content and function of the teacher's questions appears necessary to determine the questions effects and further suggested that teachers are not prepared to develop and utilize the questioning process effectively.

Gagnon (1965) analyzed an experimental methodology for teaching-thinking for clarifying values and drew the following conclusions:

1. Focused instruction, like an in-service workshop, is needed for teachers to learn how to ask probing thinking and value type questions such as the clarifying question.
2. As teachers attempt to ask more clarifying questions they appeared to ask more and tell less.

He further indicated that the study revealed as teachers ask more questions they appeared to tell less and involve the students in classroom interaction to a greater degree.

Schreiber (1967) found, in a study titled "Teacher's Question-Asking Techniques in Social Studies", that the types of questions used very little were those that could be considered of a divergent nature. (Divergent questions is defined for the purposes of this study in the basic instrument used for analysis purpose--see appendix.) Schreiber also indicated there was a distinct difference in the types of questions used in the post-instructional lessons taught as a part of his project. Basically during the developmental lesson an increase was noted in the use of questions calling for defining and clarifying information as well as drawing for conclusions. In the review lesson an increase was noted in the use of questions that call for 1) arranging information in sequential order 2) giving descriptions 3) making comparisons for identifying the main part of important segments of material. Guszak (1967) reported in the Reading Teacher that over ninety percent of all comprehension questions are met with congruent responses on the first student try. He further indicated that in essence the student was merely parroting back those bits of trivia in detail available to him in the story. Guszak also suggested, "perhaps the use of a tape recorder would indicate to teachers their patterning practices with regard to such potentially dangerous questioning practices."

Walter Waetjen, (1965) Director of Bureau of Educational Research and Field Services, University of Maryland, indicated the types of questions teachers used to structure the teaching skills play an important role in 1) the kinds of thinking skills 2) the range of information to be covered and 3) the thinking skills they may learn. He went ahead to add that, "unless a teacher is consciously aware of the impact of his questions on students of science he is not unlike the hunter who fires his gun into the dark. He knows not where the target is nor does he know where his shots fall." Waetjen, in this discussion, was drawing from the work of Festinger, Farnsworth, Costick and others.

Elizabeth Hunter (1969) found in her study that teachers have a tendency, even if they begin with a broad question to narrow the question down if it is not immediately answered, so that they often take the divergent, convergent or evaluative question and make it cognitive memory. Since most teachers have little training in question asking they tend to use cognitive memories most exclusively. Dr. Hunter also found that about ninety-five percent of all the questions asked, in her study, were of recall form.

Gallager and Ashner pointed out that the kind of thinking that youngsters engage in depends upon the kinds of questions teachers ask. We might infer from their statement and others noted in our study that teachers are not aware of the varieties which may be developed in terms of types of questions, nor does there seem to be an understanding of the patterns that might be utilized in classroom questioning.

Bellack (1963) and others presented a creative description of how teachers and students interact, characterizing the rules of the "classroom game." Bellack and his associates, using a category system, found in their study of fifteen high school social studies teachers that the two most common patterns of classroom discourse, making up nearly fifty percent of the interaction were (a) teacher solicitation - student response and (b) teacher solicitation - student response - teacher reaction. Although the study was done in the secondary school, Bellack indicated he felt it was relevant for elementary schools.

In summation of the work completed by Bellack apparently teachers and pupils follow common patterns in their classrooms which can be described and classified and would seem to indicate generally that classrooms are predominately controlled by dominative teacher behavior. Although Bellack discusses the ideas of patterns, these are merely inferred and not specifically researched.

Frances Minor (1966) stated that, "productive questioning" makes for productive teaching. Cueing students to action through question patterns reveal the meanings they have gleaned from their interactions with their environment. Cue students to possible threads from their own backgrounds, which they might break, twist or pull together as relevant to ideas and explorations.

Hilda Taba found that the most marked single influence on the cognitive performances seem to reside in the impact of the teaching strategies. The impact is exercised in a variety of ways; by the nature of the questions asked, what the teacher gives the student or seeks from him, the timing of these acts... Among these the nature of the questions seems to play an especially influential role. Taba goes ahead to infer that the pattern established by the teacher in the approach to questions oftimes is a determinant of the success or failure of the purposes being sought at any particular time. (Taba, 1964)

Summation

The summary of the research related to inquiry reveals a growing interest in the general area of the transactional processes. The many facets of interaction are being studied and the importance of the questioning act in the total area of inquiry is revealed in practically each research study directly related to the transactional processes but very little has been done to complete or draw specific research from this area.

While the topic of patterns is referred to in a number of research articles, it is not specifically studied either as a central research topic or as a related area. This seems to produce an anomaly in that while we profess the importance of the inquiry area and questioning in particular there is little research to support our feeling of importance for this area in teaching.

CHAPTER II

Methodology

Objective

This study attempted to establish a basis for the testing for the following hypothesis: there are no patterns of inquiry apparent in the audio transactions by the elementary teacher during classroom discussion periods. Special emphasis was placed upon the questions as asked by the teacher during the transactional process.

Procedures

A. Major Assumptions

For the purposes of this study the following assumptions applied: 1) The categorization of the questions as asked by the teacher does give an indication of the pattern of inquiry in teaching. 2) The design of this study and personnel used reduced those elements that might show results due to the Hawthorne effect.

B. Population and Sample

The study utilized a double sample, randomly selected, each including thirty certified teachers actively involved in teaching in the elementary school during the period of the study. The elementary teachers participating in the study did achieve the following standing in their profession:

a. Fully certified in the State of Kansas, b. Fully responsible for a self-contained classroom in the elementary schools. In those few instances where the teacher did not wish to participate in the study, their name was withdrawn and replaced by the first person in order taken from the second random sample.

C. Data and Instrumentation

The general plan followed in conducting this study provided for a random sample of two groups of thirty elementary school teachers as participants in the study which was accomplished in the months of August and early September. These teachers were contacted and their participation requested. Seven teachers for various reasons did not wish to participate and were replaced from the second random sample group.

After completion of the list of participants they were provided with audio-tape cartridges and mailers with information relative to the mechanical and technical aspects for recording purposes.

Each teacher was requested to make one tape, with a maximum length of fifteen minutes recording time, which was then returned for analysis purposes. Each teacher was asked to tape record a lesson that could be considered a portion of the on-going aspects of her classroom and specifically not a review nor introduction to a topic or area of study. With a few exceptions each teacher provided three tape recordings during the year. One in the early Fall, one shortly after the mid-year, one in the early Spring of the school year. No information pertaining to the analysis of their tapes was provided the participants of the project at any time. They were informed they would receive some "feedback" at the end of the project.

In an effort to achieve a more realistic picture of the teaching act as it was transpiring in these classrooms no observers were sent into these classrooms as the tape recordings were being made.

The observation guide used in the analysis of the tape recordings was the Questions Analyzer - copyrighted 1966 by Robert Pate (see appendix).

The analysis of all tape recordings for the purposes of this study was completed by one member of the research team.

D. Limitations

For the purposes of this study the following limitations are applicable: 1) The determination of the transactional patterns are limited to the recorded actions as analyzed during this study. 2) The conclusions drawn from this study are limited to the patterns drawn from the audio-analysis.

Table 1 provides a picture of the tapes provided by each participant in the project. In some instances participants did not provide all the tapes requested. A total of twenty-one cooperated in providing the three tapes requested while six teachers provided two tapes and three teachers provided only one tape. All teachers were contacted and initially agreed to participate and cooperate fully in the project. Those teachers who, in the final analysis, did not provide the tapes as requested did not indicate their change nor intent to change until after mid-year or later at which time it was impossible to draw other people into the program. All tapes submitted were utilized for analysis purposes in this study.

TABLE 1

Tapes - As Submitted By Each Teacher

Teacher Number	Tape 1	Tape 2	Tape 3
1	X	X	X
2	X	X	
3	X	X	X
4	X	X	X
5	X	X	X
6	X	X	X
7	X	X	X
8	X	X	X
9	X	X	X
10	X	X	X
11	X	X	X
12	X	X	X
13	X	X	
14	X		
15	X	X	X
16	X	X	
17	X	X	X
18	X	X	X
19	X	X	X
20	X	X	X
21	X	X	
22	X	X	X
23	X	X	X
24	X	X	X
25	X	X	
26	X	X	X
27	X		
28	X	X	X
29	X	X	
30		X	

CHAPTER III

Findings

Analysis of Tape 1

The first tapes submitted for analysis in this project were received early in the Fall semester, 1968. The raw data and distribution of percentile comparisons may be seen on Table 2. The analysis of these tapes generally substantiates prior research especially where convergence in questioning is a factor for analysis. It is interesting to note that 81.4% of the questions asked were allotted to two of the categories on the analysis sheet. 55.9% of the questions, as asked and analyzed from Tape 1, fell in the rote recall convergent category (C4 on the Questions Analyzer-see appendix) requiring the least thinking as far as the child is concerned. 25.5% of these questions were tallied in the inquiry for opinion category, which while being divergent, cannot indicate the level of divergence involved.

Nine (32%) of the participants in the research project opened their questioning pattern as analyzed in Tape 1 with a request for an opinion from their students, while over fifty percent of the teachers in this sample started their questioning process with the recall and rote memory type question.

TABLE 2

Composite Raw Data and Percentiles - Tape 1

Teacher Number	Convergent 4	Convergent 3	2	1	Category IO	1	2	Divergent 3	Divergent 4
1	15	5				2	6		
2	19	4			1	2			8
3	15	1	1		1	2			
4	29	2			3			1	2
5	13					18	6		
6	25	1	3		3	3			
7	17	5							1
8	8					1			
9	15	3			13				
10	19				2				5
11	10	1			1	2		1	
12	3	1			27				
13	16		1		5				7
14	3					1			1
15	11				6	1			
16	18	1			8	2			
17	8				11	1			
18	14	1			4				
19	8				7				3
20	7	1			11	1			
21	1				9	2			
22	7	1	3	1	2	2		3	
23	13	4			4			2	3
24	3				18	3			
25		1			9	3			
26	32	1			2				2
2	21	1			2	1			4
28	16				1				1
29	1				13				
*30									
%	55.9	4.4	1.0		25.5	5.3	0.9	1.0	5.6

*No tape submitted

One of seventeen teachers of this group began with a pattern of four or more questions during the teaching process that were of the maximum convergence or the rote recall level.

The range for the total number of questions asked and analyzed for purposes of this study was a minimum of five and a maximum of thirty-eight with the mode falling at eighteen, nineteen and twenty questions which comprised 28.5% of the total sample.

The basic request was for a 15.0 minute tape. The minimum time submitted by one participant fell at 7.0 minutes with seventeen participants submitting 15.0 minute tapes. Six submitted tapes for a time period of 10.0 to 15.0 minutes and the balance of five submitting tapes ranging from 7.0 to 9.9 minutes.

Twelve (42.8%) of the participants closed their questioning session with a divergent or inquiry for opinion form of question while the balance of the participants closed their questioning session with a convergent or rote memory type question. Sixteen (57.1%) closed their teaching sessions with a convergent question. Eleven of these were of the maximum convergence (C4) or simple rote recall form.

An analysis of the patterns in questioning revealed that twelve or 42.8% of the teachers asked a divergent question at the mid-point in their questioning patterns. The mid-point for purposes of analysis was determined by dividing the total number of questions asked by two for each participant and locating that question on the graphic analysis sheet.

Analysis by varying categories revealed few differences in the questioning patterns where teachers are compared by age. Table 3 presents the summary of questions as categorized with their percentile rankings. The age categories were 22-35 and 36 and above as the primary age ranges for analysis purposes.

TABLE 3

Raw Data and Percentiles by Age Categories - Tape 1

		22-35		36+	
		Raw Data	%	Raw Data	%
Con	4	184	58.0	184	51.1
	3	19	6.0	15	4.2
Question Categories	2	3	.9	5	1.4
	1	0	0.0	1	.3
	IO	69	21.8	94	26.1
	1	16	5.0	31	8.6
	2	0	0.0	12	3.3
	3	3	.9	4	1.1
Div	4	23	7.3	14	3.9

It is interesting to note that the younger teachers used slightly more of the rote memory form of question as categorized in C4, but also used 7.3% of their questions at the maximum divergence level when compared with the older teachers (36 and above) who utilized only 3.9% of their questions in this maximum divergence category (D4). The younger teachers as presented on Tape 1, utilized 35% of their questions in divergent forms of questions, while the teachers age 36 and above used 44% of their questions for divergent activities. In the preceding figures, the inquiry for opinion category was considered a divergent activity.

There was a slight difference in the number of questions as asked by the two age groups with the younger teachers asking 317 questions while the teachers age 36 and above submitted 360 questions on their tapes for analysis purposes.

Table 4 presents the analysis of Tape 1 as categorized by the years of experience for the participants in the project. The categories were 1-5 years experience, 6-20 years experience, and 20 years and over.

The teachers with 1-5 years experience submitted a total of 305 questions while the teachers with 6-20 years experience submitted 220 questions and the teachers with 20 or more years experience submitted the minimum with 148 questions. It is interesting to note that the teacher with 20 or more years experience utilized less than half the questions when compared with the youngest teacher group.

TABLE 4

Raw Data and Percentiles by Experience Categories - Tape 1

		1-5		6-20		20+	
		Raw Data	%	Raw Data	%	Raw Data	%
Con	4	180	59.0	129	58.6	58	39.2
Question Categories	3	18	5.9	9	4.1	7	4.7
	2	4	1.3	3	1.4	1	.7
	1	0	0.0	1	.5	0	0.0
	IO	68	22.3	48	21.8	47	31.8
	1	13	4.3	11	5.0	23	15.5
	2	0	0.0	0	0.0	12	8.1
	3	3	1.0	4	1.8	0	0.0
Div	4	19	6.2	15	6.8	0	0.0

A review of Table 4 shows the close relationship between the teachers with 1-5 and 6-20 years experience but a distinction may be drawn between those two groups as compared with the teachers with 20 or more years experience. The first primary difference falls in the rote recall category (C4) where the teachers with 1-5 and 6-20 years experience both fell within 4/10 of one percent of each other at 58.6-59.0. While the teachers with 20 years and over in experience utilized only 39.2% of their questions in this simple rote recall category. The teachers in the two categories falling from 1-20 years experience utilized close to the same number of inquiries for opinions. The teachers with 1-5 years experience utilized 22.3% while the teacher with 6-20 years experience utilized 21.8% as compared with the teacher having 20 years or more in experience utilizing 31.8% of her questions for the solicitation of opinions. For a comparison of the divergent activities the experience elements apparently began to play a role in whether teachers ask divergent questions or not. The teachers with 1-5 years experience utilized 33.7% of their questions for divergent activities including the inquiry for opinion. The teachers with 6-20 years experience utilized 35.4% of their questioning activities for divergent solicitations while the teacher with 20 years or more experience utilized 55.4% of her questioning activities for divergence in thinking.

Analysis of Tape 2

The second tapes were submitted by the participants during the period just before and shortly after their Christmas holiday. The composite picture and distribution of percentile comparisons may be seen in Table 5. By comparison with Tape 1, you might note that as a group the teachers utilized 5.6% more of the simplest convergent type question (C4) while also utilizing fewer inquiries for opinion. It would be well to note also at this point that

TABLE 5

Composite Raw Data and Percentile - Tape 2

Teacher Number	Convergent				Category			Divergent	
	4	3	2	1	IO	1	2	3	4
1	2	1			8				
2					10				
3	17	1							
4	17					4		1	
5	5	1			4				
6	17	2							
7	7	4	2						
8	3	2			3	2			
9	8	1			1	1			
10	7			1				1	
11	12	2							
12	12				1	4			1
13	1								
*14									
15	4				1			3	1
16	4		1	1	2	5		3	1
17	1	3			10				
18	22	2			2				
19	13	1				2			
20	11				1			8	
21					3	1			
22	3		1			11			
23	16	2			2				
24	17				2				1
25	12				6				
26	26	1				1			3
*27									
28	10	3			2				
29					8				
30	6		1		19				
%	61.5	5.8	1.1	.4	19.0	6.9	0.0	3.5	1.5

*No tape submitted

while there was only 9/10 of one percent difference when you compare the total divergence in questioning there was 4.1% difference at the maximum levels with the first tapes revealing a higher percentage of questions calling for the maximum levels of thought. For purposes of analysis there were a total of 447 questions analyzed as shown on Table 5. This is compared with 364 submitted and shown on Table 8 and a total of 676 questions submitted and shown on Table 2 (note that not all teachers submitted all three tapes as requested).

There were twenty-eight teachers' tapes used in the category of experience levels. Analysis of Tape 2 by these experience levels reveals that teachers with 1-5 years experience began their teaching session with a pattern of four or more of the simplest form of questions while only one teacher in each of the categories 6-20 and 20 or more years began their teaching session with this pattern of questioning. There were no differences where teachers began their teaching sessions with requests for opinions from their students for this category.

A study of the composite raw data and percentiles where categorized by years of experience is shown in Table 6.

It is interesting to note that the younger teachers used approximately 10% more of the simplest of recall questions

TABLE 6

Raw Data and Percentiles by
Experience Categories - Tape 2

Question Categories		1-5		6-20		20+	
		Raw Data	%	Raw Data	%	Raw Data	%
Con	4	130	66.7	83	53.2	40	54.1
	3	12	6.2	11	7.1	3	4.1
	2	3	1.5	2	1.3	0	0.0
	1	0	0.0	2	1.3	0	0.0
	IO	36	18.5	27	17.3	22	29.7
	1	9	4.6	18	11.5	4	5.4
	2	0	0.0	0	0.0	0	0.0
	3	1	.5	12	7.7	3	4.1
Div	4	4	2.1	1	.6	2	2.7

than did the teachers in other experience categories. Table 6 also reveals that those teachers with 1-5 years experience were using 7.1% of their questions in the divergent categories, exclusive of inquiry for opinion, while the teachers with 6-20 years experience were using 18.8% and the teachers with 20 or more years experience were using 12.1%.

The experience categories also show that those teachers with 1-5 years experience submitted a range of from one to thirty-one questions for the complete lesson while those with 6-20 years experience submitted nine to twenty-six questions and those with 20 or more years experience submitted ten to eighteen questions as the range for Tape 2. And as a final point of information for the age group categories as submitted on Tape 2, only those teachers with 6-20 years experience ended their questioning session with a divergent form of question. In this case three teachers closed their sessions in this manner while no teachers closed their teaching session with a divergent question for either of the other two experience categories.

The teachers' questions by age group categories were combined as indicated in Table 7 and revealed a close comparison in almost all categories. The category showing the least similarities would be the inquiry for opinion where almost 10% difference was noted in the questions used by those people in age group 36 and above where compared with the other age category.

The minimum and maximum times as submitted by these teachers in Tape 2 were 8.25 minutes minimum time and 15.0 minutes maximum time for the age group 22-35 with 5.5 minutes the minimum time and 15.0 the maximum time for the age group 36 and above.

The analysis of Tape 2 also revealed that three of the teachers in the age group 36 and above ended their teaching session with a divergent question while none of the teachers in the age group 22-35 completed their questioning or discussion session with a divergent question.

TABLE 7

Raw Data and Percentiles by Age Categories - Tape 2

		22-35		36+	
		Raw Data	%	Raw Data	%
Con	4	162	64.8	118	58.4
Question Categories	3	15	6.0	11	5.4
	2	3	1.2	2	1.0
	1	0	0.0	2	1.0
	IO	55	22.0	30	14.9
	1	10	4.0	21	10.4
	2	0	0.0	0	0.0
	3	1	.4	15	7.4
Div	4	4	1.6	3	1.5

Analysis of Tape 3

The third tapes were submitted, by the participants in this project, late in the Spring semester, 1969. The raw data and distribution of percentile comparisons may be seen in Table 8. It is interesting to note that the composite shows a higher degree of convergence with Tape 3 than was revealed in the analysis of Tape 1. This is especially true when we compare the maximum convergence category No. 4 which comprised 63.4% of the total questioning acts in Tape 3, while totaling only 55.9% in Tape 1. There is an even greater difference in the teachers' requests for opinions where analysis

TABLE 8

Composite Raw Data and Percentile - Tape 3

Teacher Number	Category								
	Convergent							Divergent	
	4	3	2	1	IO	1	2	3	4
1	3					2		2	
*2									
3					3				2
4	24								
5					5				
6	17	1				4	1	1	1
7	28		3			1			
8	18	1			6				
9	8	4			4			1	
10	6		4		3				
11	7				4	6			
12	14			1	1	2			1
*13									
*14									
15	6				4				
*16									
17					7				
18	9	1	1		5	2			
19	13				1	7			
20	5				6	7			1
*21									
22	2		4	2		1			2
23	13	5				3			
24	10	1			2	4			
*25									
26	34				2				
*27									
28	14	1							
*29									
*30									
%	63.5	3.8	3.3	.8	14.6	10.7	.3	1.1	1.9

*No tape submitted

of Tape 3 revealed 14.5% while Tape 1 totaled 25.5%. For purposes of comparison there was only a 1% difference between those divergent questions excluding inquiry for opinion where Tapes 1 and 3 were compared.

Four (19%) of the participants in the research project opened their questioning pattern as analyzed in Tape 2 with a request for an opinion from their students, while ten (47.6%) of the teachers in Tape 3 started their questioning with the simplest of the convergent categories.

Thirteen teachers (61.9%) began their questioning with a convergent form of question. Of this group of thirteen, ten began their teaching sessions with the simplest of recall type question.

In each case in Tape 3, all those questions presented in the teaching period were analyzed. In no instance did the number of questions run beyond thirty-six. It appeared that each teacher had completed her discussion session at that point. Analysis of the closing question for those teachers submitting Tape 3 revealed that eleven (52.3%) teachers closed their teaching sessions with a convergent form of question, four (19.0%) teachers closed their teaching lesson with a divergent or open-ended question while six (28.5%) closed their teaching session with a question calling for a child's opinion.

Five (23.8%) of the teachers in this group began their questioning with a pattern of four or more questions. In all instances this series of questions were all at the simplest convergence level on the Questions Analyzer Scale. There were no instances of a pattern of four or more questions being asked at the divergent level, excluding inquiry for opinion, at any point during the questioning acts on the tapes as analyzed for this group of teachers.

The minimum time submitted by any participant in this group was 5.75 minutes while the maximum time was 15.0 minutes as specified as maximum to be analyzed in our original discussions with the teachers.

The range in numbers of questions as asked by the teachers was from a minimum of five questions, with two teachers submitting this minimum amount, up to a maximum of thirty-six questions for their teaching session. In this instance the teacher submitting thirty-six questions utilized exactly 11.0 minutes for her teaching period.

In an effort to determine the kinds of activities going on during the mid-point of the discussion session an analysis of the middle question was made. This question was determined by taking the total number of questions, dividing by two, and locating it on the graphic analysis presentation (see appendix). It was found that eleven (57.8%) were proceeding with a convergent question while seven (36.8%) were asking questions of an opinion nature and one teacher (5.2%) was asking a question of a divergent nature.

Analysis of Tape 3 by varying categories revealed no great differences in the questioning patterns where teachers are compared by age. Table 9 reveals the composite picture for those teachers ages 22-35 as compared with those ages 36 and above.

TABLE 9

Raw Data and Percentiles by Age Categories - Tape 3

		22-35		36+	
		Raw Data	%	Raw Data	%
Con	4	157	75.5	74	47.4
Question Categories	3	8	3.8	6	3.8
	2	3	1.4	9	5.8
	1	0	0.0	3	1.9
	IO	18	8.7	35	22.4
	1	19	9.1	20	12.8
	2	1	.5	0	0.0
	3	1	.5	3	1.9
Div	4	1	.5	6	3.8

For comparison purposes, four teachers of this group aged 22-35 began their questioning series with a pattern of four or more convergent questions while only one teacher in the group 36 and above began with a pattern of four or more of a similar level. Two other teachers began their questioning pattern with an opinion request with one of these teachers falling into each of the age groups under consideration.

As the teaching period progressed an analysis of the mid-point question was made. Little difference was found between the age groups with the exception that there were no teachers in the age group 22-35 who were asking a divergent question at the mid-point while there was one teacher in the 36 and above age group asking a divergent question at the mid-point in her discussion. Seven of the teachers in each of the categories were asking convergent questions at that point while two teachers in the age bracket 22-35 were asking opinion questions and four teachers in the age bracket 36 and above were asking opinion questions.

It is interesting to note that the times for the tapes submitted varied somewhat at the minimum levels with the age groups 22-35 submitting a range of 10.0 minutes to 15.0 minutes while the ages 36 and above group submitted tapes with a minimum of 5.2 minutes and a maximum of 15.0 minutes for analysis purposes.

A study of the patterns for those teachers submitting Tape 3, categorized by years of experience, did reveal some differences. The categories chosen were 1-5 years experience, 6-20 years experience, and 20 years and over. Four of the beginning teacher group (1-5 years experience) began their questioning series with four or more of the simple rote recall questions (C4 on the Questions Analyzer). While only one of the teachers with 6-20 years experience began her pattern at this level, none of the teachers with 20 or more years experience began their questioning pattern in this manner. It was also interesting to note that none of the beginning teachers began with a pattern of four opinion questions while only one in each of the other two categories began their series of questions with a pattern of four or more opinion questions.

TABLE 10

Raw Data and Percentiles by
Experience Categories - Tape 3

		1-5		6-20		20+	
		Raw Data	%	Raw Data	%	Raw Data	%
Con	4	152	77.1	56	46.2	23	50.0
Question Categories	3	12	6.1	2	1.6	0	0.0
	2	3	1.5	9	7.4	0	0.0
	1	0	0.0	2	1.6	1	2.1
	IO	14	7.1	26	21.4	13	28.2
	1	12	6.1	23	19.0	4	8.7
	2	1	.5	0	0.0	0	0.0
	3	2	1.0	0	0.0	2	4.3
Div	4	1	.5	3	2.4	3	6.5

Table 10 is a presentation of the raw data and percentiles by experience categories for Tape 3. Some interesting points of information drawn from Table 10 are the differences in percentages of the simplest recall forms of questions. The beginning teachers exhibited 77.1% while the teachers with 6-20 years experience exhibited 46.2% and the 20 year teachers exhibited 50%. There was also a wider difference where the beginning teacher was utilizing only 7.1% of her questions as opinions while the teacher with 6-20 years experience was utilizing 21.4% of her questions for opinions. The teacher with 20 or more years experience was utilizing 28.2% of her questions for the soliciting of opinions. Wider variations can also be noted when composites are developed for all those divergent questions with the exception of inquiries for opinions. The teacher with 1-5 years experience was utilizing 8.1% of her questions in the divergent area while the teacher with 6-20 years experience was utilizing 21.4% and the teacher with 20 or more years experience was utilizing 19.5%.

The range of time as exhibited by the teachers with differing years of experience showed that the teachers with 1-5 years experience provided us with a Tape 3 ranging from 10.0 minutes to 15.0 minutes. The teachers with 6-20 years experience provided us with a third tape ranging from 5.75 to 12.5 minutes. The teacher with 20 or more years experience provided us with a third tape ranging from 5.2 minutes to

12.5 minutes.

The range of the questions as asked by these teachers in Tape 3 shows that the teachers with 1-5 years experience asked a minimum of seventeen to a maximum of thirty-six questions while the teachers with 6-20 years experience asked a minimum of seven and a maximum of twenty-one questions. The teachers with 20 or more years experience asked a minimum of five to a maximum of nineteen questions.

Composite Analysis by Categories

Since the participants in this project represented a wide variety of categories it would seem appropriate that we review a cross-section of these groupings.

The compilation of all tapes presented by those teachers who were teaching in a Title I school revealed a range of from one question to thirty-two questions submitted for the discussion periods for any single tape. Within this group of teachers it was discovered that only two teachers out of all the tapes submitted started their discussion periods with four or more rote recall questions of the very simplest of levels. Only one started her questioning period with an inquiry for opinion. The five teachers working in the Title I schools submitted a range of time running from 8.0 minutes to 15.0 minutes and in only two instances did they close their teaching sessions with a divergent question excluding an inquiry for opinion.

There were five teachers involved in the Master's degree category. When the participants were categorized by the Master's degree and Tapes 1, 2 and 3 compiled, we discovered the range of the questions ran from one to twenty-eight questions. Two of these teachers started their discussion sessions with a pattern of four or more questions of the simplest convergent level while only one teacher started with a pattern of four or more questions that were inquiries for opinion. The Master's degree teachers submitted 5.2 minutes as the minimum time while utilizing 15.0 minutes as the maximum time for their discussion sessions as submitted. Only two teachers in this category ended their discussion session with a divergent question.

When we reviewed the compilation of Tapes 1, 2 and 3 with reference to the categories of graduate hours, we found there were sixteen teachers who had completed 0-10 graduate hours and fourteen teachers who had completed 11 and more graduate hours in this particular category. Those teachers having completed 0-10 hours graduate work asked a range of from four to thirty-seven questions while those teachers having completed a range of from 11 or above graduate hours asked a range of from one to thirty-seven questions. Eleven of the teachers with 0-10 graduate hours started their discussion session with a pattern of four or more of the simplest form of questions while seven of the teachers with 11 or more graduate hours began their discussion periods with a similar pattern. Only four of the teachers with 0-10 hours started their questioning session with a pattern of four or more inquiry for opinions while three of those teachers with 11 and above graduate hours completed started their discussion sessions with four or more requests for opinions from their students. This group had a minimum range of time at 7.2 minutes for the teachers with fewer graduate hours as compared with 5.2 minutes for those teachers having 11 hours or over. The maximum time submitted for this category was set at 15.0 minutes. It is interesting to note that over twice the number of teachers ended their discussion sessions with a divergent question in that seven teachers with 0-10 graduate hours ended their discussion periods in this manner while only three teachers with 11 or more graduate hours ended their discussion sessions with this form of question.

Table 11 shows the total number of tapes submitted when we categorized by grade level. An analysis of all tapes submitted when categorized by grade levels reveals first that the range in the number of questions asked runs from five to twenty-one questions for the complete teaching session in grades 1 and 2 with one to thirty-five questions being the range of questions asked by teachers in the grade

TABLE 11

Total Number of Tapes Submitted by Grade Level

	1-2	3-4	5-6
Three Tapes	6	24	33
Two Tapes	2	6	4
One Tape	1	1	1
Total	9	31	38

three and four category and four to thirty-seven questions being the range for those teachers working with grades 5 and 6. No teacher started her discussion session with four or more rote recall questions of the simplest level in grades 1 and 2 while four teachers began their teaching session in this manner in grades 3 and 4 and fourteen teachers began their teaching session with this pattern in grades 5 and 6. When we review the inquiry for opinion area with reference to grade levels we find that only one teacher in grades 1 and 2 began her session with a pattern of four or more questions in the inquiry for opinion area while three teachers in grades 3 and 4 and three teachers in grades 5 and 6 began their sessions with this pattern of activities.

It is interesting to note, on further analysis, that the teachers of grade levels 5 and 6 submitted the minimum range in time with 5.2 minutes as that minimum time and 15.0 minutes being the maximum time. The teachers from grade levels 3 and 4 submitted 8.0 minutes as their minimum time with 15.0 minutes being their maximum time while the teachers in grades 1 and 2 submitted a minimum time of 7.2 minutes with the maximum time being 14.1 minutes. When we review the manner in which each grade group completed their discussion sessions we find that there are some differences when the raw data is reviewed. Six (15.8%) of the teachers in this group teaching grades 5 and 6 ended their discussion sessions with a divergent question (divergent for this item included all those categories labeled as divergent in the Questions Analyzer other than the inquiry for opinion). Three (9.6%) of the teachers working with grades 3 and 4 ended their discussion sessions with a divergent question while only one (11.1%) teacher working with the grades 1 and 2 closed their teaching session in that manner. There was a total of 78 tapes submitted for analysis within the grade level categories. Table 12 is the presentation of the raw data and percentiles for Tape 1 when categorized by grade levels. Table 13 presents the raw data and percentiles when categorized by grade levels for Tape 2. Table 14 presents the raw data and percentiles for grade level categories as analyzed from Tape 3.

TABLE 12

Raw Data and Percentiles by Grade Level Categories - Tape 1

		1-2		3-4		5-6	
		Raw Data	%	Raw Data	%	Raw Data	%
Con	4	23	41.8	149	50.9	195	59.5
Question Categories	3	0	0.0	13	4.4	21	6.4
	2	0	0.0	4	1.4	4	1.2
	1	0	0.0	0	0.0	1	.3
	IO	26	47.3	93	31.7	44	13.4
	1	2	3.6	13	4.4	32	9.8
	2	0	0.0	0	0.0	12	3.7
	3	0	0.0	1	.3	6	1.8
Div	4	4	7.3	20	6.8	13	4.0

TABLE 13

Raw Data and Percentiles by Grade Level Categories - Tape 2

		1-2		3-4		5-6	
		Raw Data	%	Raw Data	%	Raw Data	%
Con	4	17	51.5	113	64.9	123	57.5
Question Categories	3	1	3.0	7	4.0	18	8.4
	2	0	0.0	1	.6	4	1.9
	1	0	0.0	1	.6	1	.5
	IO	9	27.3	36	20.7	36	18.7
	1	2	6.1	5	2.9	24	11.2
	2	0	0.0	0	0.0	0	0.0
	3	3	9.1	9	5.2	4	1.9
Div	4	1	3.0	2	1.1	4	1.9

TABLE 14

Raw Data and Percentiles by
Grade Level Categories - Tape 3

Question Categories		1-2		3-4		5-6	
		Raw Data	%	Raw Data	%	Raw Data	%
Con	4	19	61.3	76	52.4	136	72.3
	3	0	0.0	7	4.8	7	3.7
	2	0	0.0	5	3.4	7	3.7
	1	0	0.0	1	.7	2	1.1
	IO	5	16.1	25	17.2	23	12.2
	1	7	22.6	25	17.2	7	3.7
	2	0	0.0	1	.7	0	0.0
	3	0	0.0	2	1.4	2	1.1
Div	4	0	0.0	3	2.1	4	2.1

CHAPTER IV

Summary, Conclusions and Recommendations

This research project was a study to determine whether teachers exhibit a pattern in the transactional processes in their room. Special emphasis was placed on the inquiry aspects of the teaching act through the analysis of the teacher's questions. This project was deemed worthwhile because of the major emphasis now being placed on the inquiry aspects of teaching and that the questioning act is the primary media through which growth in this area can be accomplished. This study evolved from the premise that little research has been done in the area of questioning.

In order to accomplish the purposes of this study it was necessary to analyze the questioning acts as exhibited by the teacher during the transactional processes in their classroom. The _Questions Analyzer_ was used as the primary instrument for the analysis of the questioning act (see appendix).

Thirty teachers were randomly selected from the greater Wichita area as participants in this project. A double random sample was developed and utilized where teachers indicated a desire not to participate in the project. Each teacher was asked to provide three tape recordings drawn from the on-going aspects of the classroom activities and primarily focusing upon the discussion sessions involving the teacher and all her pupils. A tape was requested for the early Fall period, mid-semester period and the late Spring period.

Each participant in the study received a set of instructions indicating the speed to be utilized for the tape recorder, that they should submit only one discussion period per tape and that the maximum time for study purposes was fifteen minutes. No observer would be present in their classroom during taping periods and their tape recordings would be transported primarily by mail.

Findings

The findings of this study considered to be more significant were as follows:

1. When each teacher's tapes were analyzed, a definite pattern in questioning is consistent for all three tapes for over 70% of the teachers in this study.
2. In the cognitive operation of recall (C4) it was revealed in summary that the teachers as a group were utilizing over 55% of their questions for rote recall activities.
3. The teachers exhibited a higher variety and wider span of divergent activities during the early portion of their school year as compared with the mid-semester and late Spring activities.

4. The more experience the teachers had the fewer questions they asked.
5. The teachers, in the study, with 20 years experience or more utilized over 20% more questions for divergent activities when compared with both other experience categories.

A high percentage of the questions as asked and analyzed for the purposes of this study were inquiries for opinions from students.

6. When all three tapes are considered there is a definite pattern for teachers to begin discussion sessions with a highly convergent (C4) form of question.

Conclusions

On the basis of the findings of this study the following conclusions would seem tenable:

1. The individual teacher does exhibit a pettern to the kinds of questions she asks where the sample was drawn over a one year period.
2. There is no apparent general pattern as displayed by all the teachers during this one year study.
3. There are some specific patterns exhibited by many teachers which are consistent throughout the year.

Examples are:

- a. Opening the discussion session with a convergent form of question.
- b. Utilizing a divergent question at the mid-point of their discussion period.

4. The teachers, in this study, utilized the inquiry for opinion as their primary divergent activity.

Recommendations for Further Study

One of the major goals for studies of the transactional processes is to attempt to learn more of what transpires between the teacher and the pupil for a broader base of information about the teaching-learning process. With this goal in mind the following suggestions for further study are tendered:

1. A replication of this study over a longer period of time to determine whether the consistencies that were discovered as a result of this study are retained over a longer period of time.
2. Relate the research in this study to the subject areas under consideration at the time to determine the differences or consistencies between and within discipline areas where questioning acts are concerned.

3. Attempt to relate the questioning act to the purposes each teacher had in mind in an effort to determine how teachers approach the accomplishment of their objectives in the classrooms.
4. A study which relates the non-verbal transmissions of the teacher to the types of questions as asked during discussion periods in elementary school classrooms.
5. An analysis of the time factor and its relationship to the questioning act.
6. Instigation of research designed, primarily, to facilitate the development in the teacher of an understanding and skill in the development of a strategy to the kinds of questions she asks.
7. Compare the patterns in questioning of the classroom teacher during her period of pre-service development and full professional responsibility as a classroom teacher.
8. A comparison of the relationships in the patterns of questioning where the classroom teacher is compared with her supervisor at the internship level and the professor's of education under whom the teacher studied.

9. An analysis of the children's responses to teacher's questions in an effort to see if there are patterns to the cues to which children respond.

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APPENDIX

APPENDIX A

QUESTIONS ANALYZER

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The QUESTIONS ANALYZER is designed to provide the professional educator with a medium for the assessment of the types of inquiry opportunities being provided by the teacher. It provides the teacher with an instrument through which she may analyze, with the use of the tape recorder, facets of her own teaching.

The analyzer places special emphasis on the frequency and total number of opportunities the teacher provides for varying levels of thought to take place. The media for determination are the types of questions the teacher asks during the teaching act.

The QUESTIONS ANALYZER is not designed as an evaluative instrument but for the distinct purpose of providing the teacher with an opportunity to be aware of some of the types of transactions taking place in the classroom.

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The Question Analyzer provides the media through which the area of questioning can be given closer analysis. The instrument has been designed with nine broad categories encompassing all the types of questions that might be asked during the teaching act, with special emphasis on the cognitive development of students in the classroom.

Directions:

The professional educator using the Questions Analyzer would find its value more quickly if he tries to adhere to the following general procedure for its use.

1. Become familiar with the general outline of the instrument and the locations of the various categories.
2. Study the explanations of each of the broad categories and attempt to develop questions in your mind that you think will fit that category.
3. Make a few trial or practice observations with the instrument so complete familiarity with both the instrument and the categories themselves are assured.
4. Do not tally a question until the child has answered or attempted to answer the question. This will help clarify the teacher's intent as seen from the child's viewpoint. The value of the Analyzer lies in the opportunity to consider the teacher's question as it appears the child interprets it.
5. It is important that the observer realize that all levels of questions can be asked at all grade levels.

Question Types:

The question categories are broken into two broad areas:

1. The Convergent type which generally involves questions that call for the child to respond with an answer that is focused upon one possible answer area.
2. The Divergent type question focuses upon an answer that is multi-faceted or involves more than one potential answer.

CONVERGENT

Question Categories

Simple Recall - One Item

This category calls for the greatest amount of convergence. The child is asked to recall one item of information. The response involves only recalling and repeating what was previously stated in class in one way or another. The following questions might fall into this group: "What is the capital of our state?" "Name the town he visited." "What baseball club made the run?"

Recall - Choice of Multiple Items

This category calls for a level of convergent thinking that is slightly below the level required for the category "simple recall--one item." The category "recall--choice of multiple items" involves recall of information previously given the pupil in one way or another, but requires a greater organization of thinking in that he will have to recall several items. The following questions might fall into this category: "Who were the culprits?" "What were the names of the towns?" "When did these things happen?" "What were their destinations?" "Who were the leaders?"

Determination of Skills Abilities (demonstrate)

This category calls for a lower level of convergence than either of the two previous categories. The category "determination of skills abilities (demonstrate)" requires the pupil to exhibit a higher degree of skill in assimilating information than any of the other convergent categories listed. The questions in this category require the pupil to demonstrate his skill, knowledge, or proficiency in an area by demonstrating before a group at the chalkboard or on paper.

Skills Demonstration (verbal)

This category calls for the least amount of convergence. Questions tallied in this column call for a verbal (only) demonstration of skills in some area. This category requires of the pupil a higher level of thought than the previous category. The following questions asked by the teacher would be tallied in this column: "How would you work this?" "Will you explain this problem to the class?" (verbal explanation).

DIVERGENT

Example - Singular

This category involves the least amount of divergence. A question in this category requires of the child a higher degree of assimilation and analysis than called for by questions in any of the categories described to this point. A question tallied in this column would require the child to have an idea so well developed that he could give an example of the area under discussion. Questions that might fit into this category are: "What will we do now?" "Will you give me an example of what you mean?" The pupil must analyze the situation to the point that he can present at least one example of the idea under discussion.

Examples - Multiple

This category involves a level of thought more demanding of the child's thought process. He must understand and be capable of illustrating, with more than one example. The examples must be different enough to illustrate a deeper level of understanding on the part of the child than the preceding category calls for. The following might fit this category: "Give me some examples of what you mean."

Principle Involved

This is the category for questions that exhibit near maximum divergence. A question fits in this category only when the teacher has asked the child to examine and evaluate just short of his maximum potential. These questions give the child an opportunity to see relationships in the area, to compare one principle with another, and to discuss potential relationships.

Concept Analysis

This category calls for thought that involves maximum divergence, drawing of inferences, and a more critical view of the facts and ideas available. The teacher's question should call for an answer that exhibits a depth of understanding that will allow the pupil to use the various processes of analysis and bring forth ideas related to the concept under discussion as well as alien ideas. Questions in this category might be: "Can we develop a basic idea from the information we have?" "What is another way to approach this problem?"

Inquiry for Opinion

Questions fit in this category when the teacher attempts to involve as many pupils as possible in the discussion. The teacher may ask: "What do you think?" "What is your opinion?" "How would you do it?" These questions involve a type or form of divergence and are, therefore, tallied in the column associated with divergence, but they are not tallied in the other divergence categories unless it appears that the teacher's intent was other than merely to ask for an opinion.

APPENDIX B

Project Participants-Descriptive Data

Teacher Number	Age	School Assignment During 1968-1969		Total Years Teaching Experience	Number of Semester Hours Earned Since Bachelor's Degree
		Title I	Non-Title I		
1	49		Kensler	23	38
2	34		Alcott	7	4
3	52		Benton	23	50
4	22		Harry St.	1	0
5	58		Carter	35	45
6	25		Meridian	4	7
7	32	Waco		1½	5
8	25		Earhart	4	20
9	42		McCollom	4½	15
10	49		Sunnyside	8	23
11	37		Sim	15½	8
12	60		Hyde	29	9
13	60	Ingalls		4	36
14	39		Price	16	10
15	54		Minneha	23	16
16	49		Wells	17	3
17	33		O.K.	11	32
18	45		Woodland	13	20
19	27		Adams	6	36
20	51		Stanley	10	6
21	24		McCollom	2	0
22	40	Mueller		11	9
23	25		Meridian	3½	9
24	34		Kensler	3½	9
25	25	Little		2	0
26	25		Woodman	3	0
27	26		Buckner	1½	66
28	61		White	20	27
29	54	Lincoln		31	14
30	22		Willard	1½	0

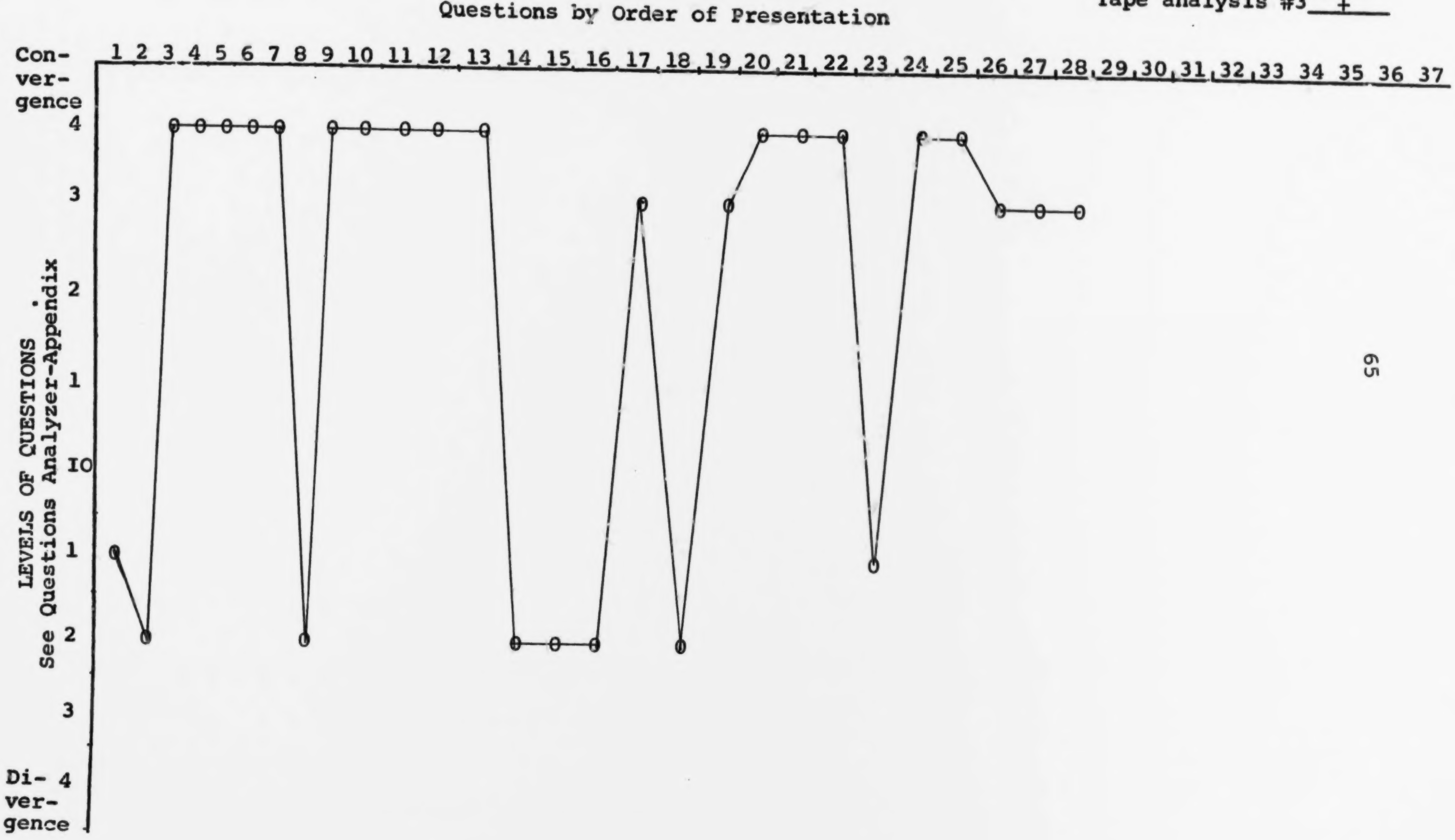
APPENDIX C

TAPE 1

GRAPHIC PRESENTATION OF TAPE ANALYSIS

Teacher # 1
Grade 5 & 6
Time 7.0

Tape analysis #1 0
Tape analysis #2 X
Tape analysis #3 +

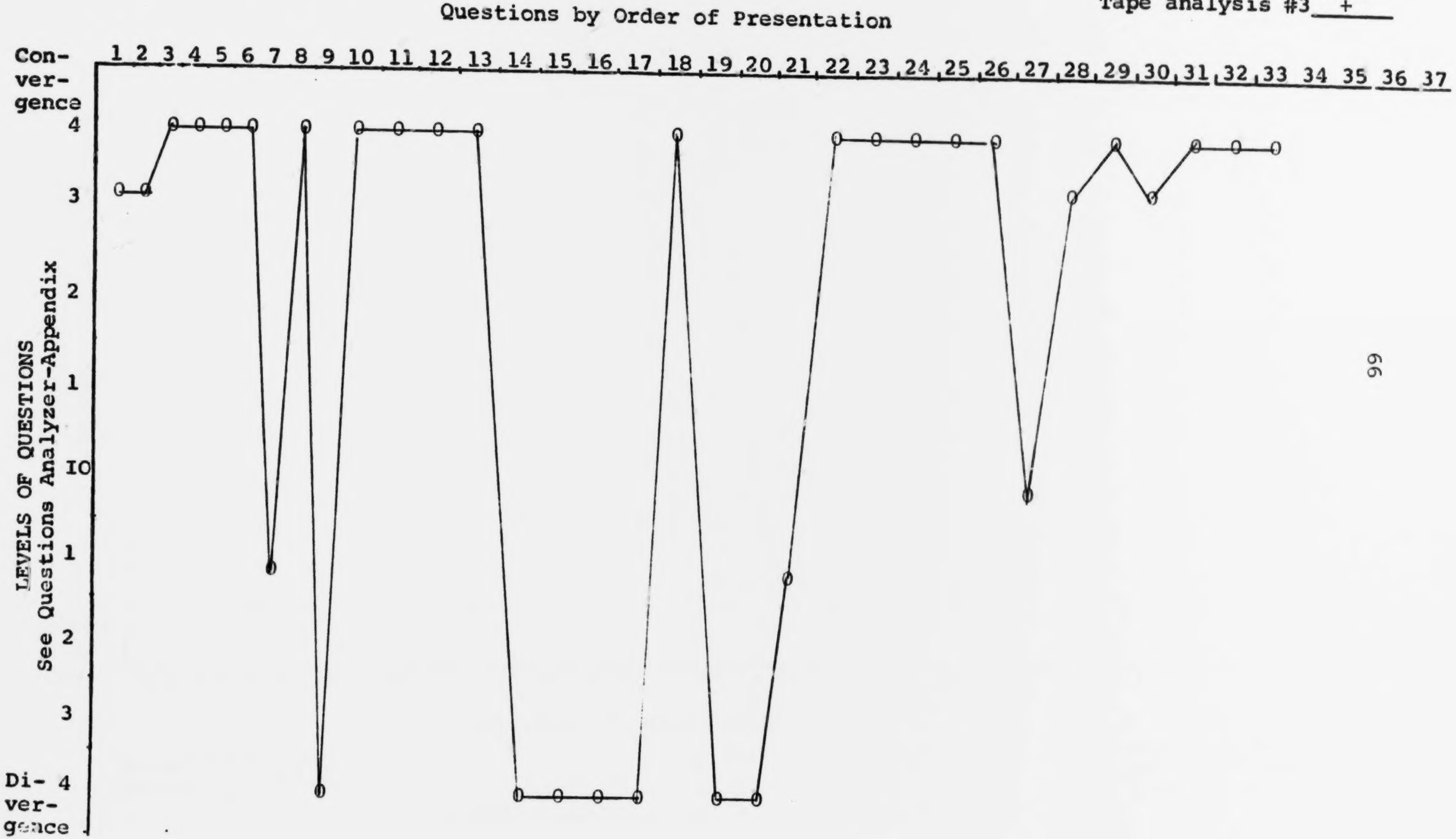


GRAPHIC PRESENTATION OF TAPE ANALYSIS

Teacher # 2
Grade 4

Time 15.0

Tape analysis #1 0
Tape analysis #2 X
Tape analysis #3 +



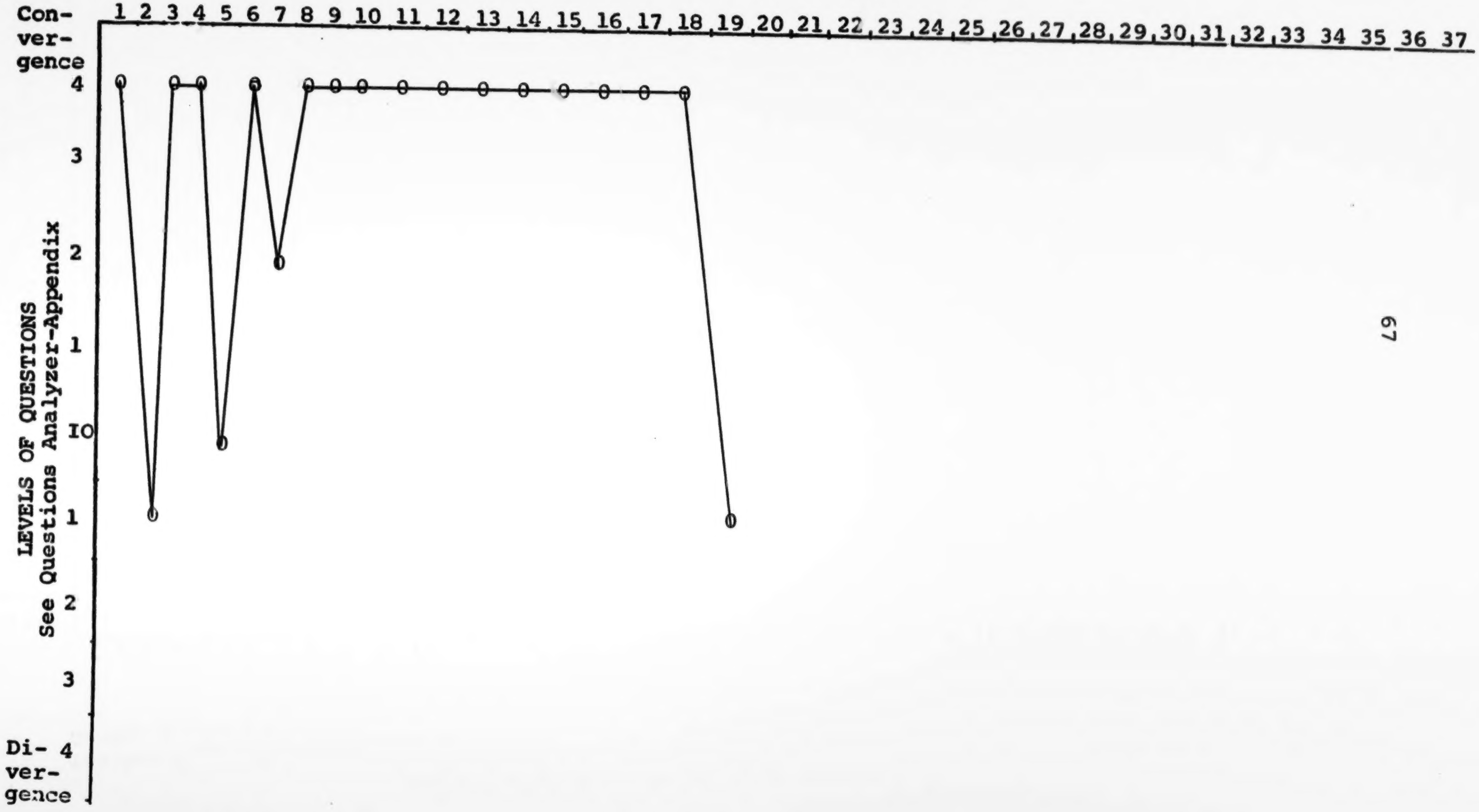
GRAPHIC PRESENTATION OF TAPE ANALYSIS

Teacher # 3
Grade 5

Time 15

Tape analysis #1 0
Tape analysis #2 X
Tape analysis #3 +

Questions by Order of Presentation



GRAPHIC PRESENTATION OF TAPE ANALYSIS

Teacher # 4
Grade 6

Time 15.0

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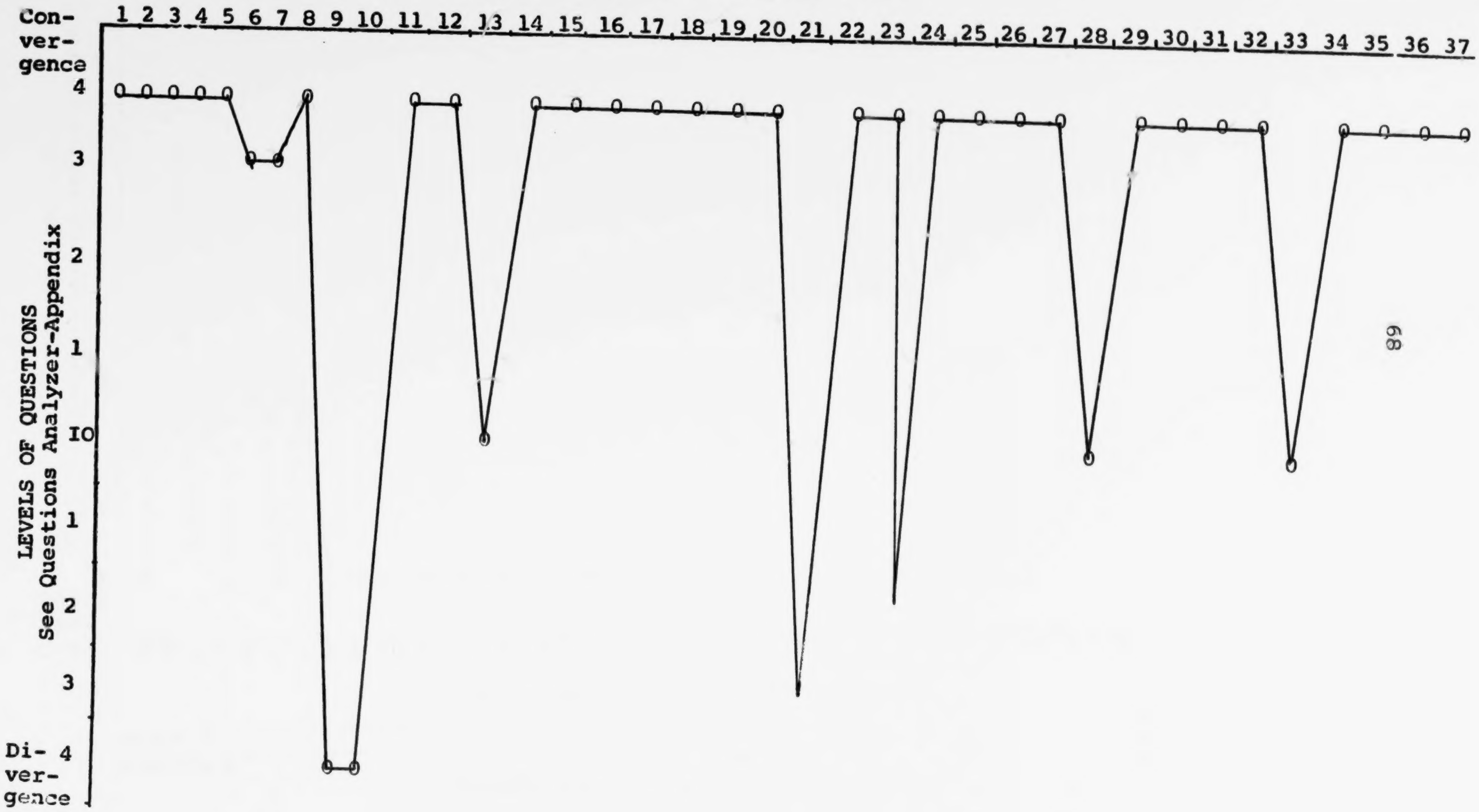
Tape analysis #3 +

Questions by Order of Presentation



GRAPHIC PRESENTATION OF TAPE ANALYSIS

Teacher # 5

Grade 5

Time 15.0

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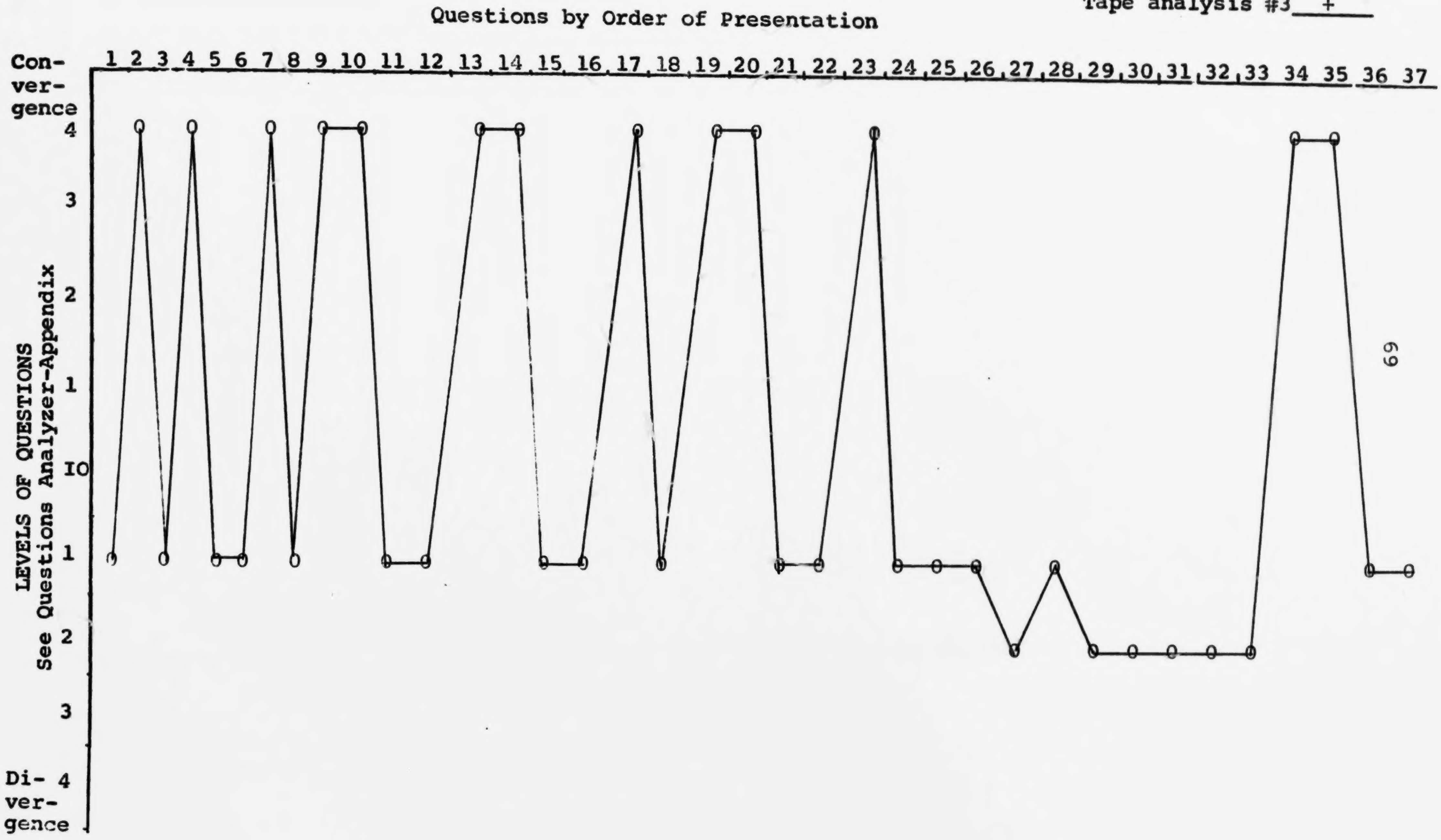
Tape analysis #3 +



GRAPHIC PRESENTATION OF TAPE ANALYSIS

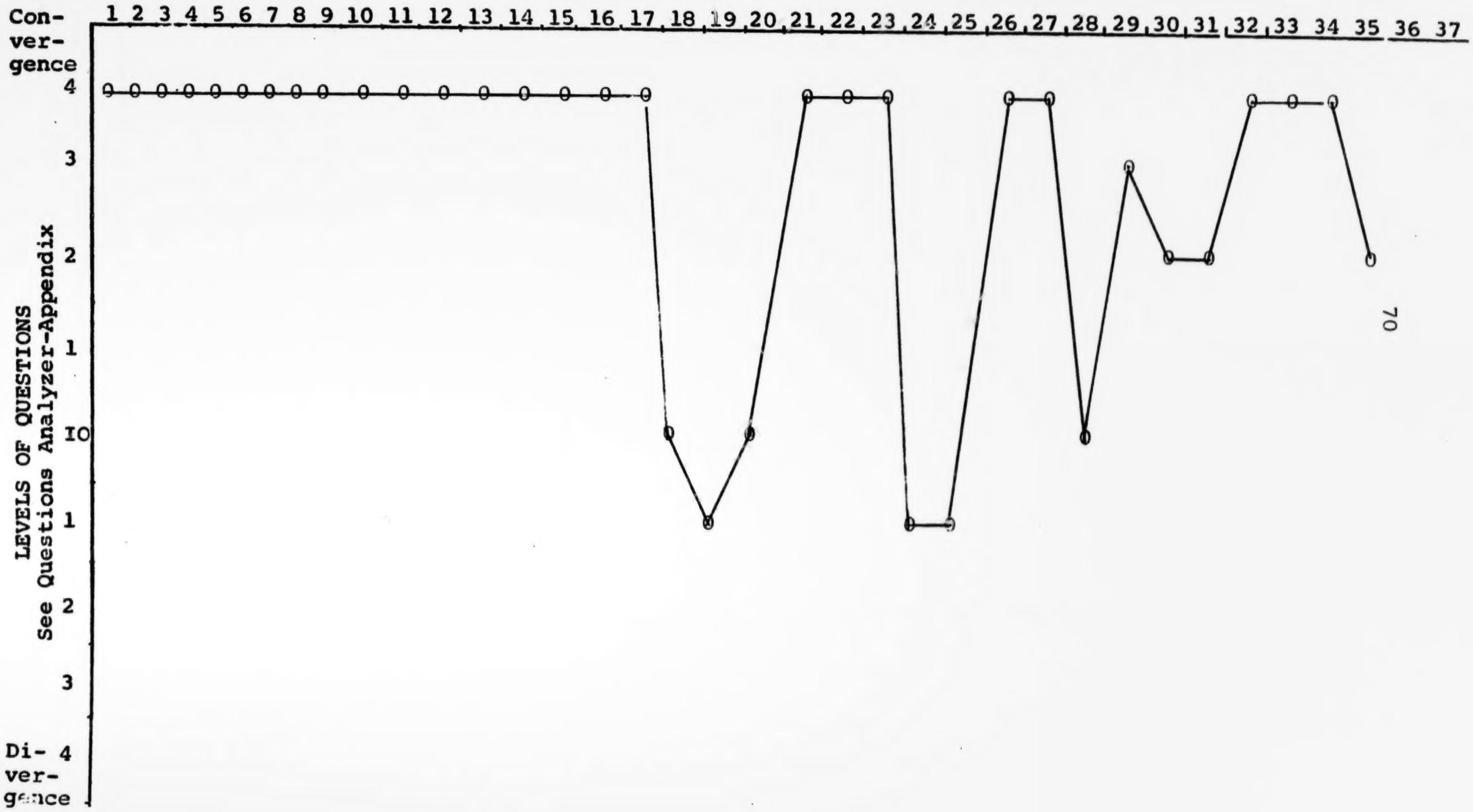
Teacher # 6

Grade 4

Time 11.7

Tape analysis #1 0
Tape analysis #2 X
Tape analysis #3 +

Questions by Order of Presentation



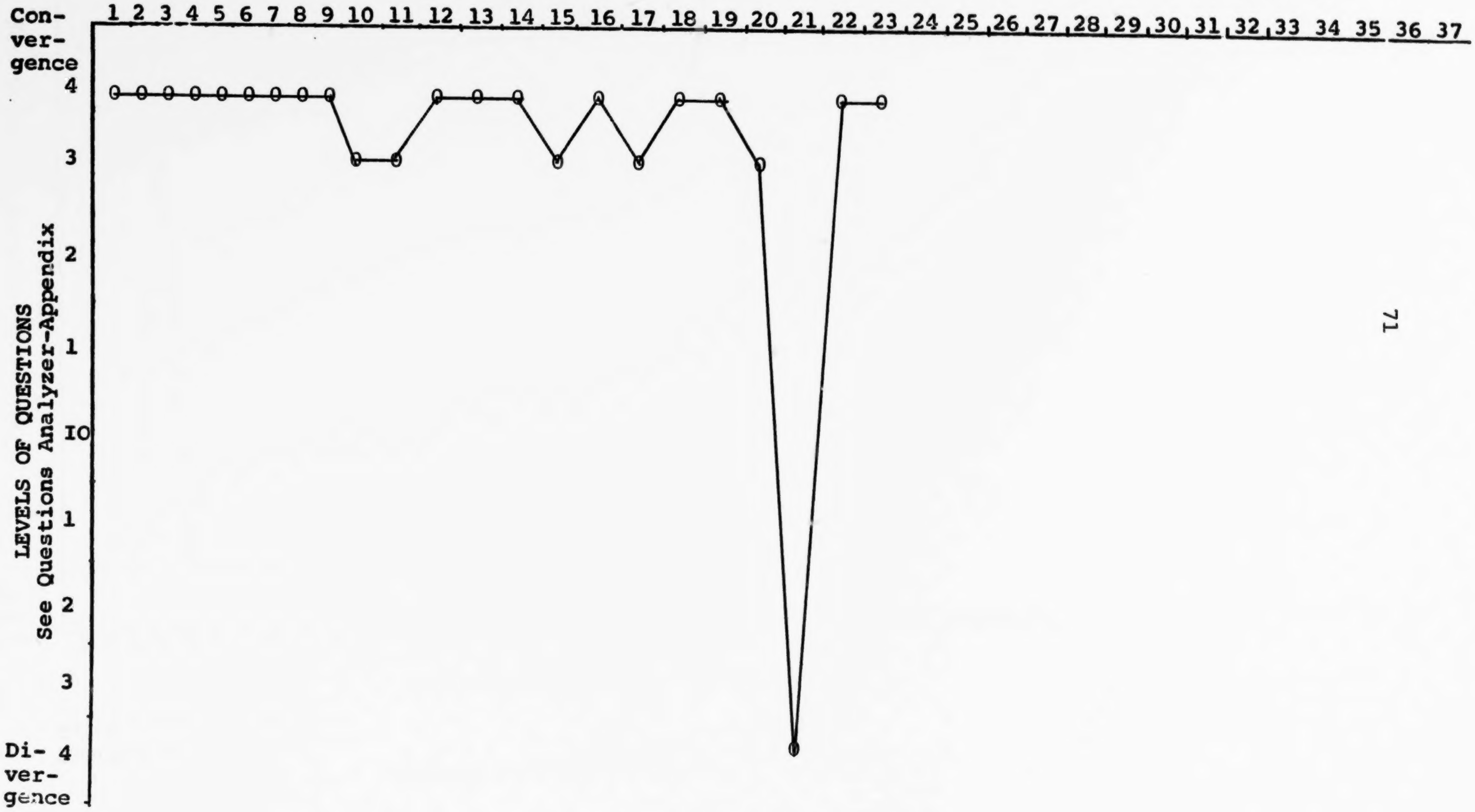
GRAPHIC PRESENTATION OF TAPE ANALYSIS

Teacher # 7
Grade 6

Time 11.8

Tape analysis #1 O
Tape analysis #2 X
Tape analysis #3 +

Questions by Order of Presentation



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Teacher # 8
Grade 5

Time 7.8

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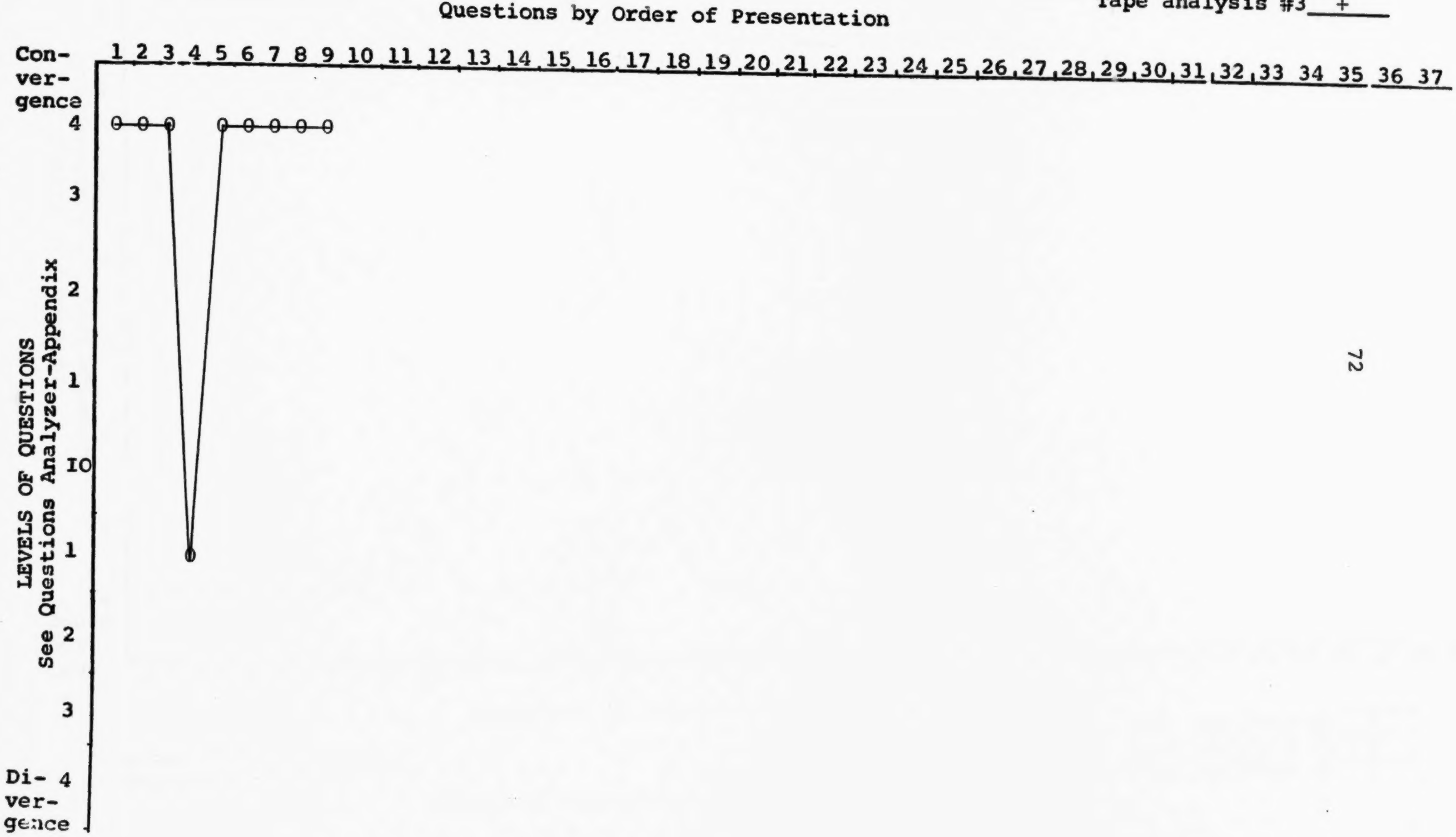
Tape analysis #2 X
Tape analysis #3 +



GRAPHIC PRESENTATION OF TAPE ANALYSIS

Teacher #9
Grade 3
Time 10.9
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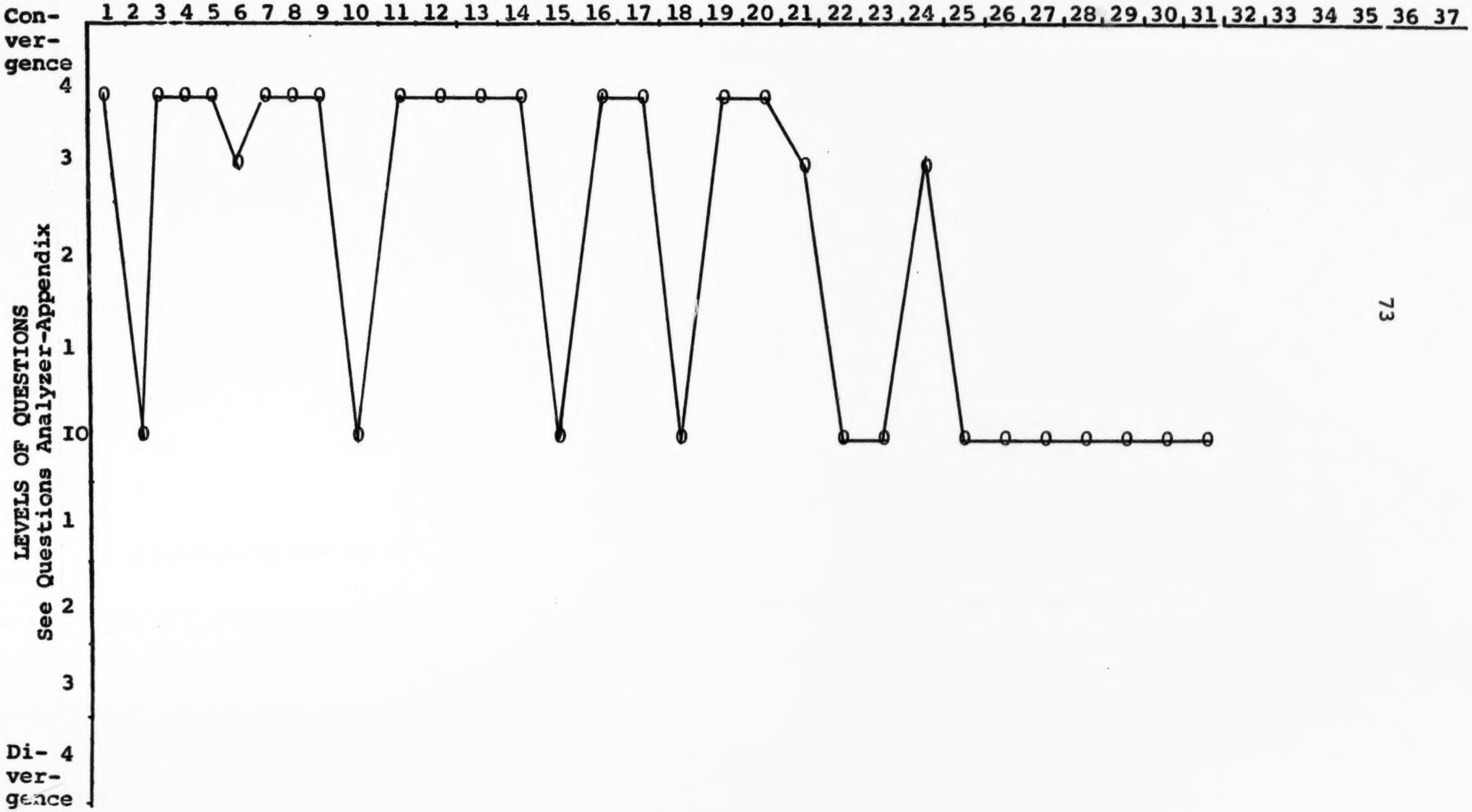
Tape analysis #2 X
Tape analysis #3 +

Questions by Order of Presentation



GRAPHIC PRESENTATION OF TAPE ANALYSIS

Teacher # 10
Grade 4

Time 15.0

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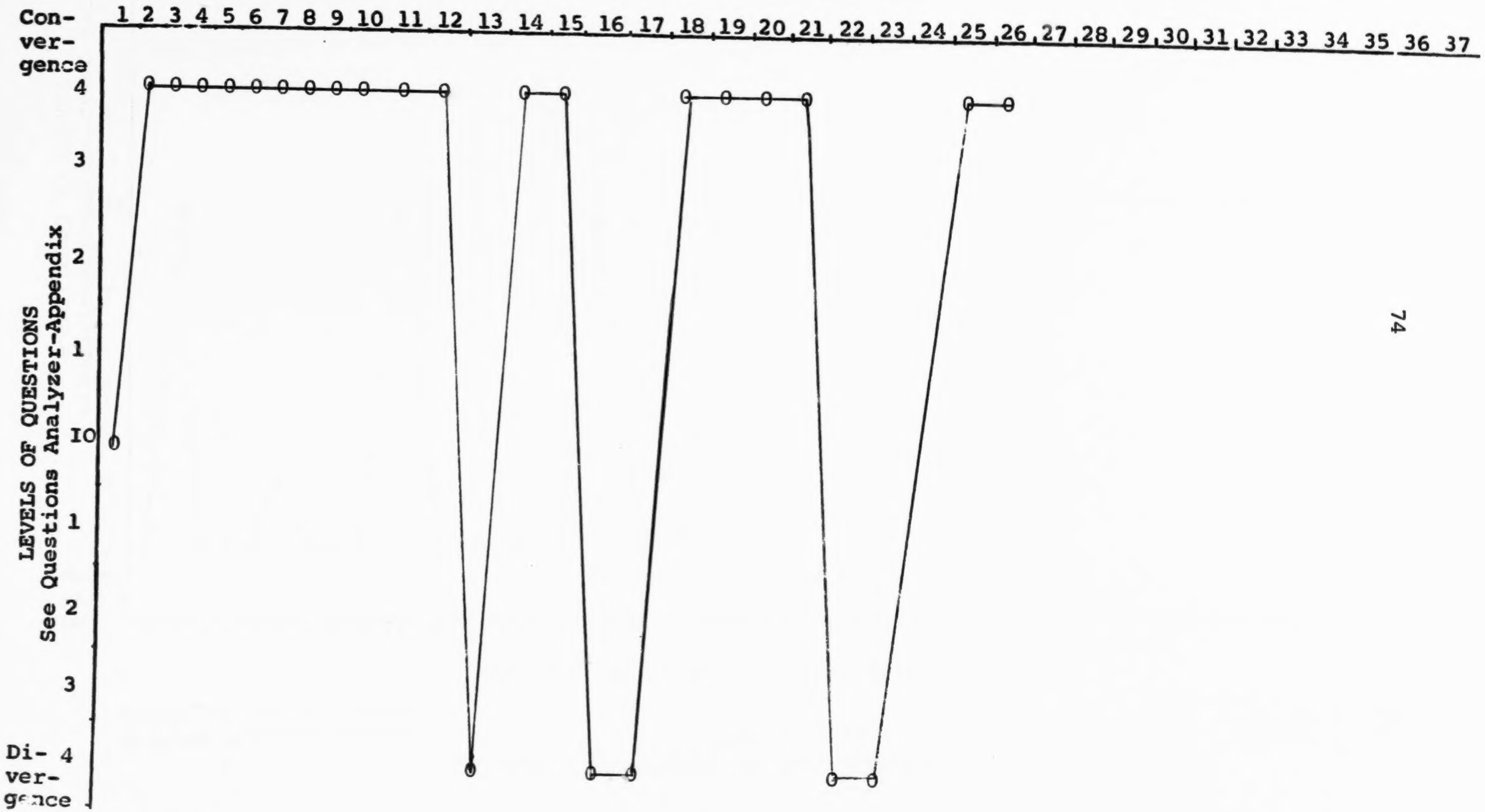
Tape analysis #3 +

Questions by Order of Presentation



GRAPHIC PRESENTATION OF TAPE ANALYSIS

Teacher # 11
Grade 4

Time 15.0

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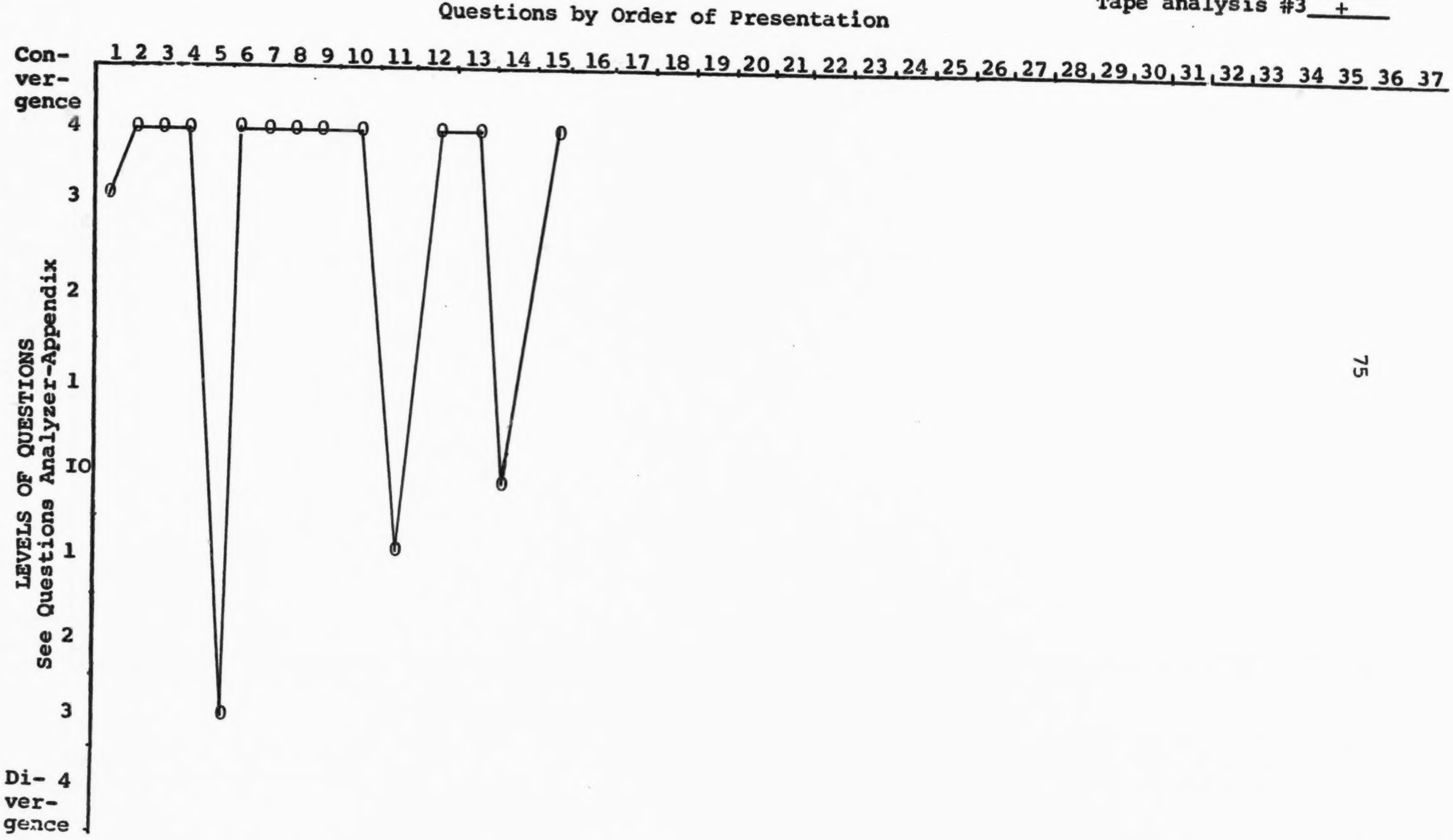
Tape analysis #2 X
Tape analysis #3 +



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Teacher # 12
Grade 3
Time 15.0
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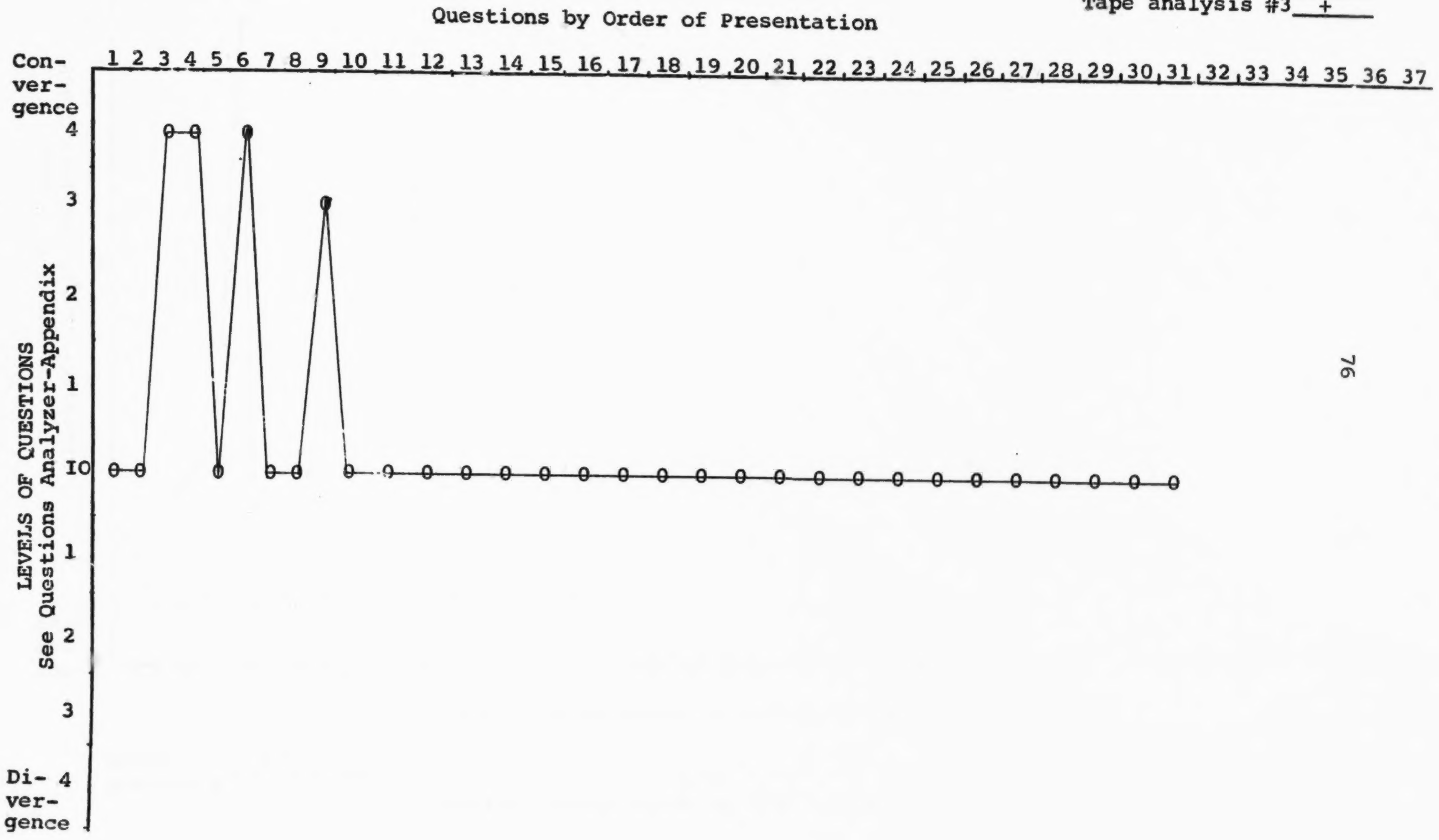
Tape analysis #2 X
Tape analysis #3 +



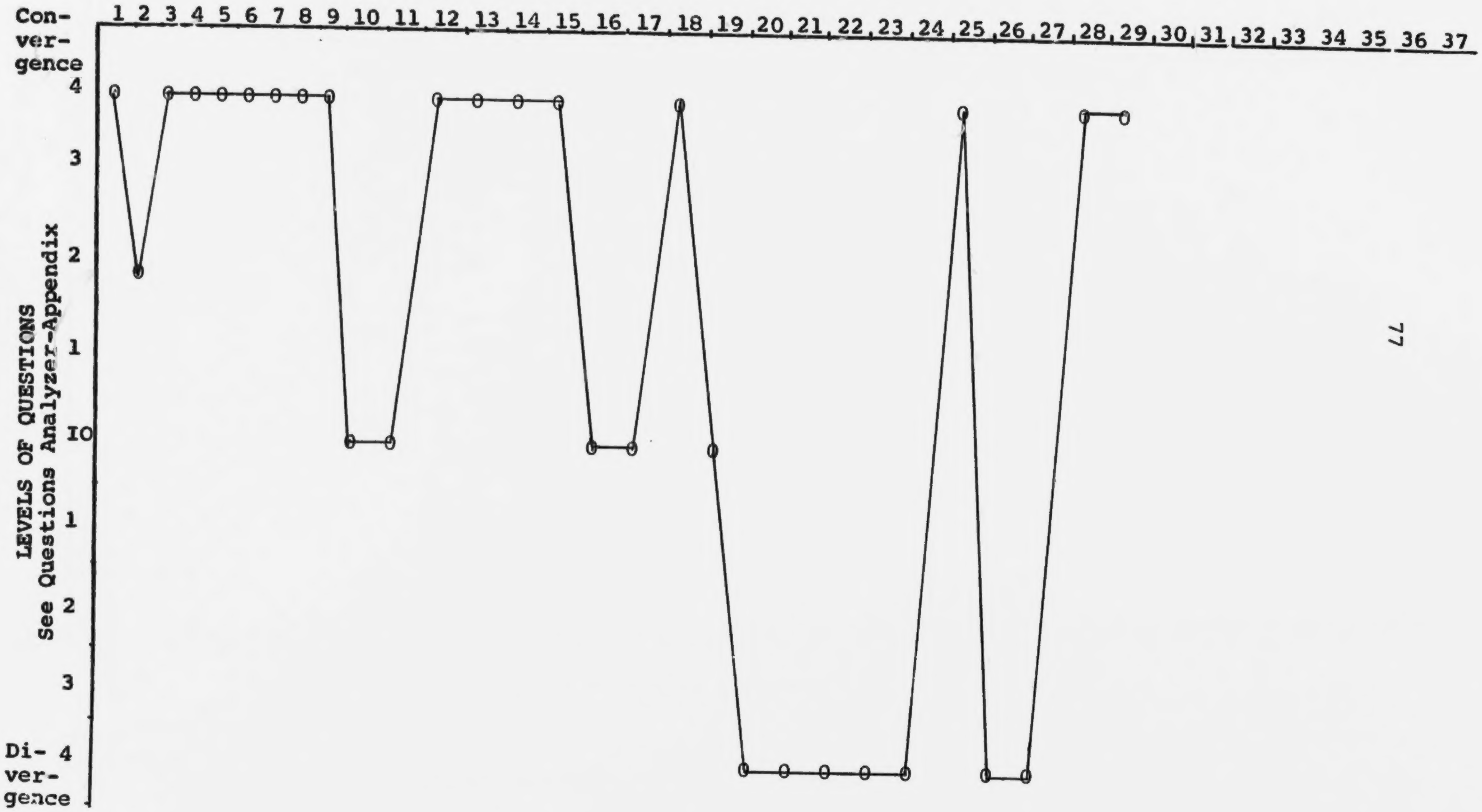
GRAPHIC PRESENTATION OF TAPE ANALYSIS

Teacher # 13
Grade 4

Time 15.0

Tape analysis #1 O
Tape analysis #2 X
Tape analysis #3 +

Questions by Order of Presentation



GRAPHIC PRESENTATION OF TAPE ANALYSIS

Teacher # 14
Grade 2

Time 7.2

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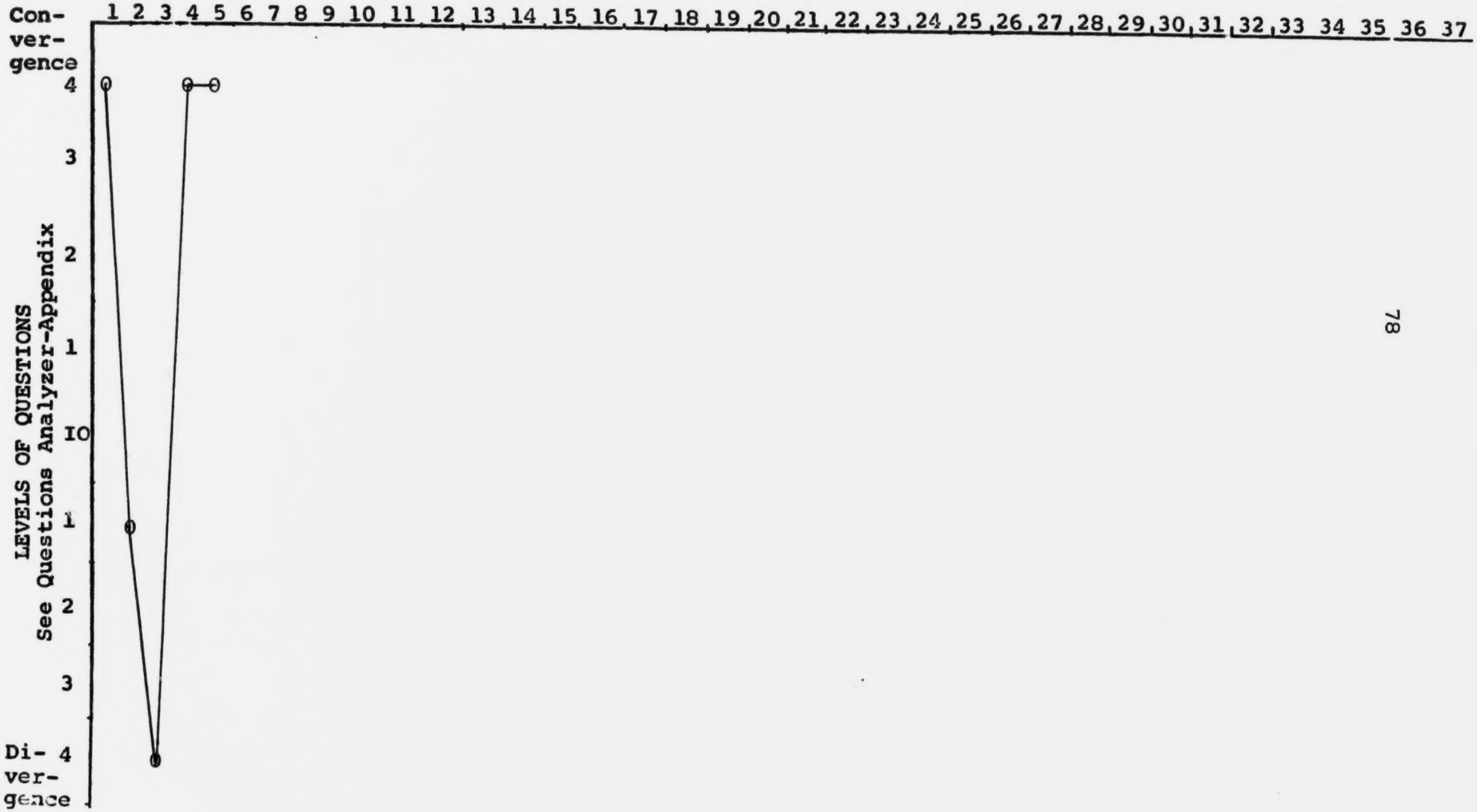
Tape analysis #2 X
Tape analysis #3 +

Questions by Order of Presentation



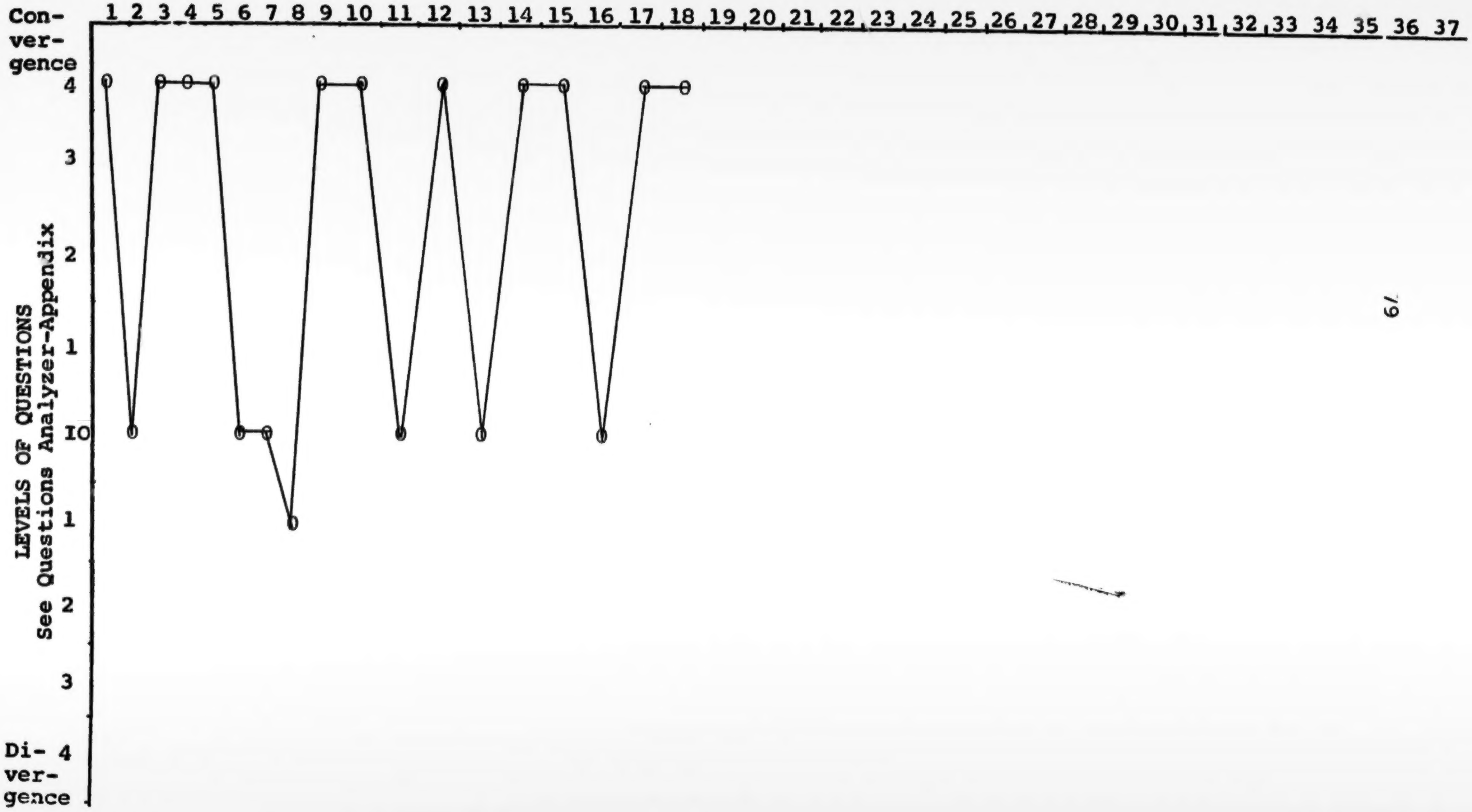
GRAPHIC PRESENTATION OF TAPE ANALYSIS

Teacher # 15
Grade 2

Time 12.7

Tape analysis #1 0
Tape analysis #2 X
Tape analysis #3 +

Questions by Order of Presentation



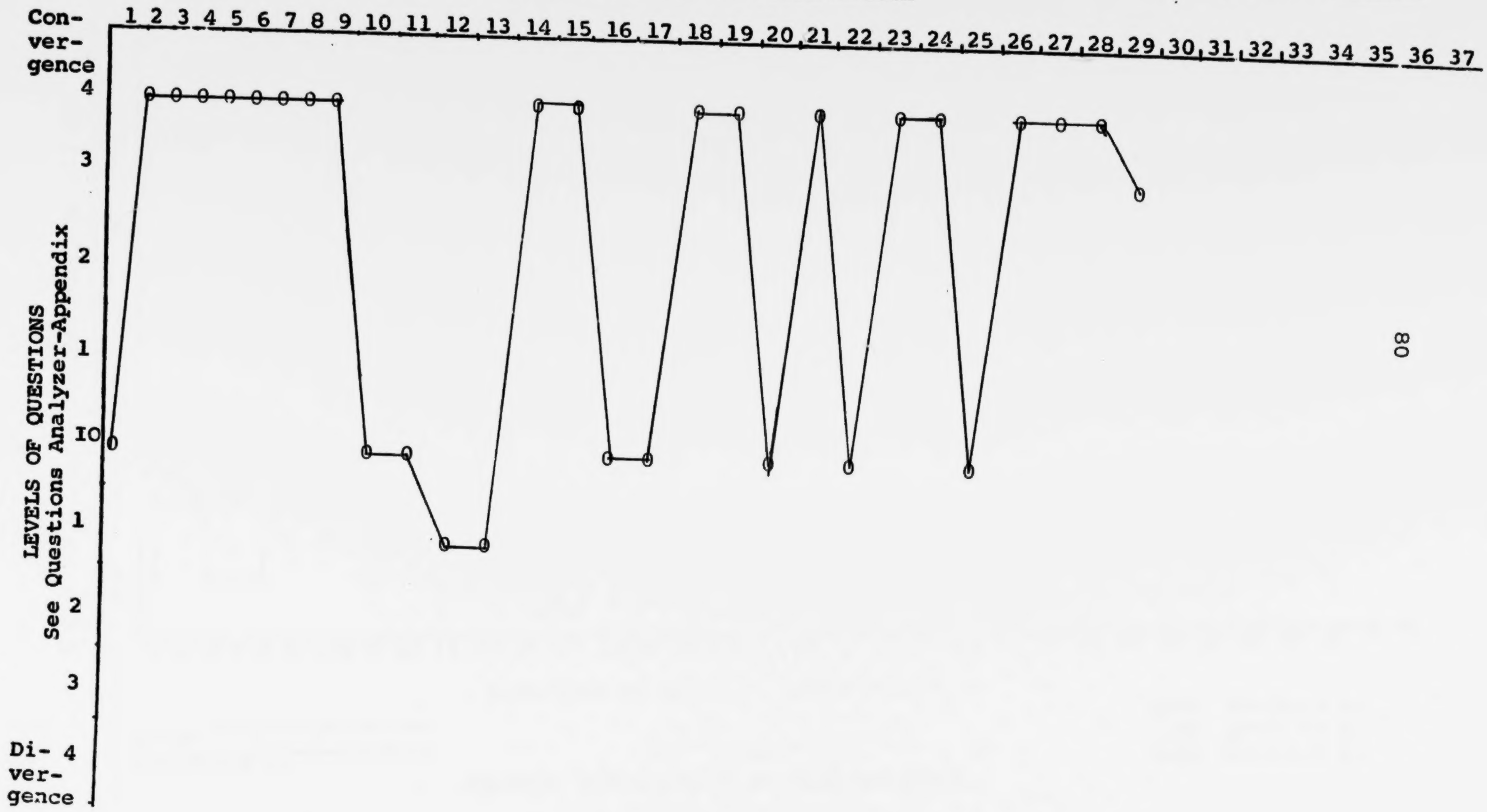
Teacher # 16
Grade 5

GRAPHIC PRESENTATION OF TAPE ANALYSIS

Time 15.0

Tape analysis #1 0
Tape analysis #2 X
Tape analysis #3 +

Questions by Order of Presentation

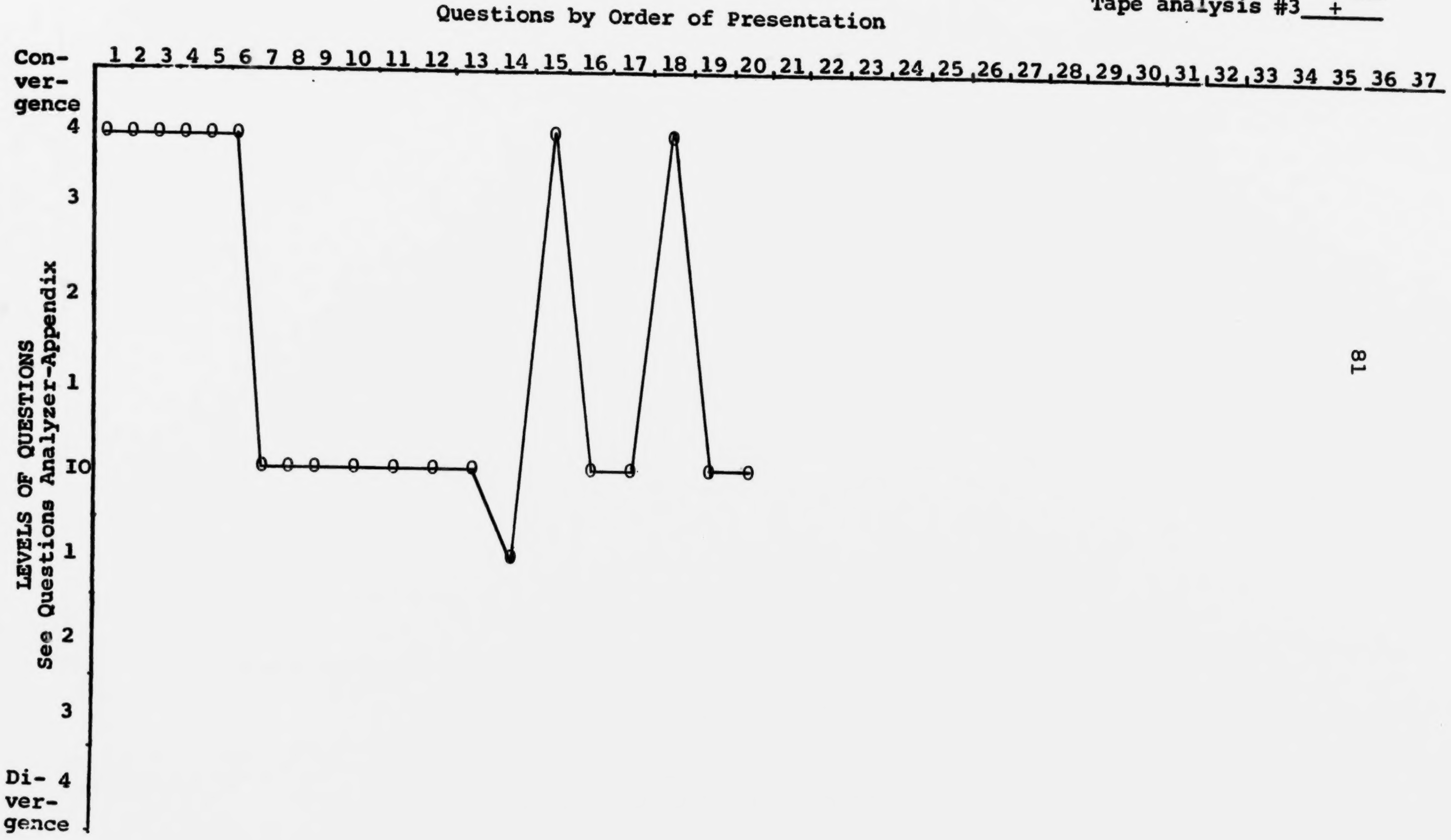


GRAPHIC PRESENTATION OF TAPE ANALYSIS

Teacher # 17
Grade 5 & 6

Time 15.0

Tape analysis #1 0
Tape analysis #2 X
Tape analysis #3 +



GRAPHIC PRESENTATION OF TAPE ANALYSIS

Teacher # 18
Grade 3

Time 8.0

Tape analysis #1 0
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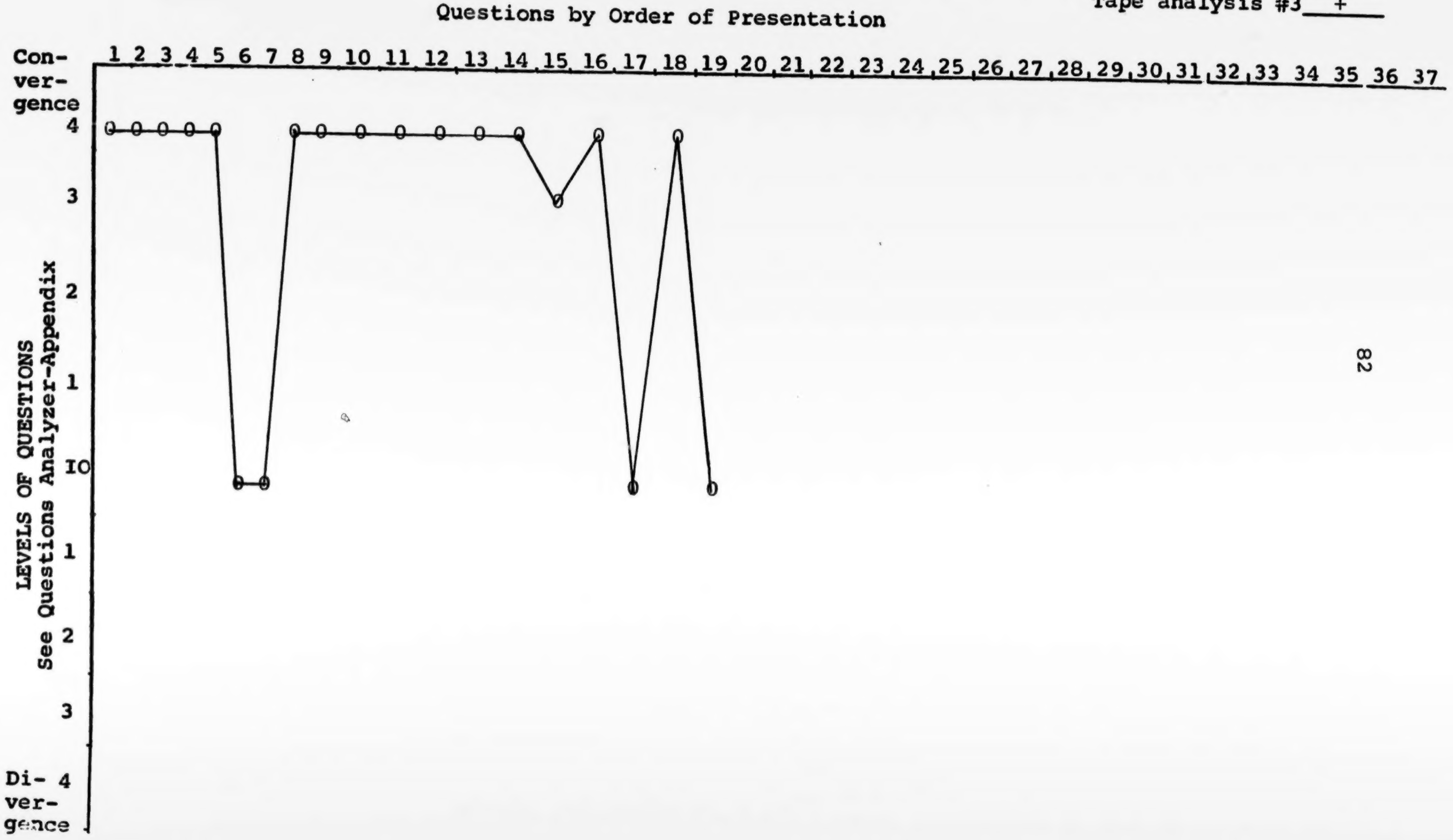
Tape analysis #3 +



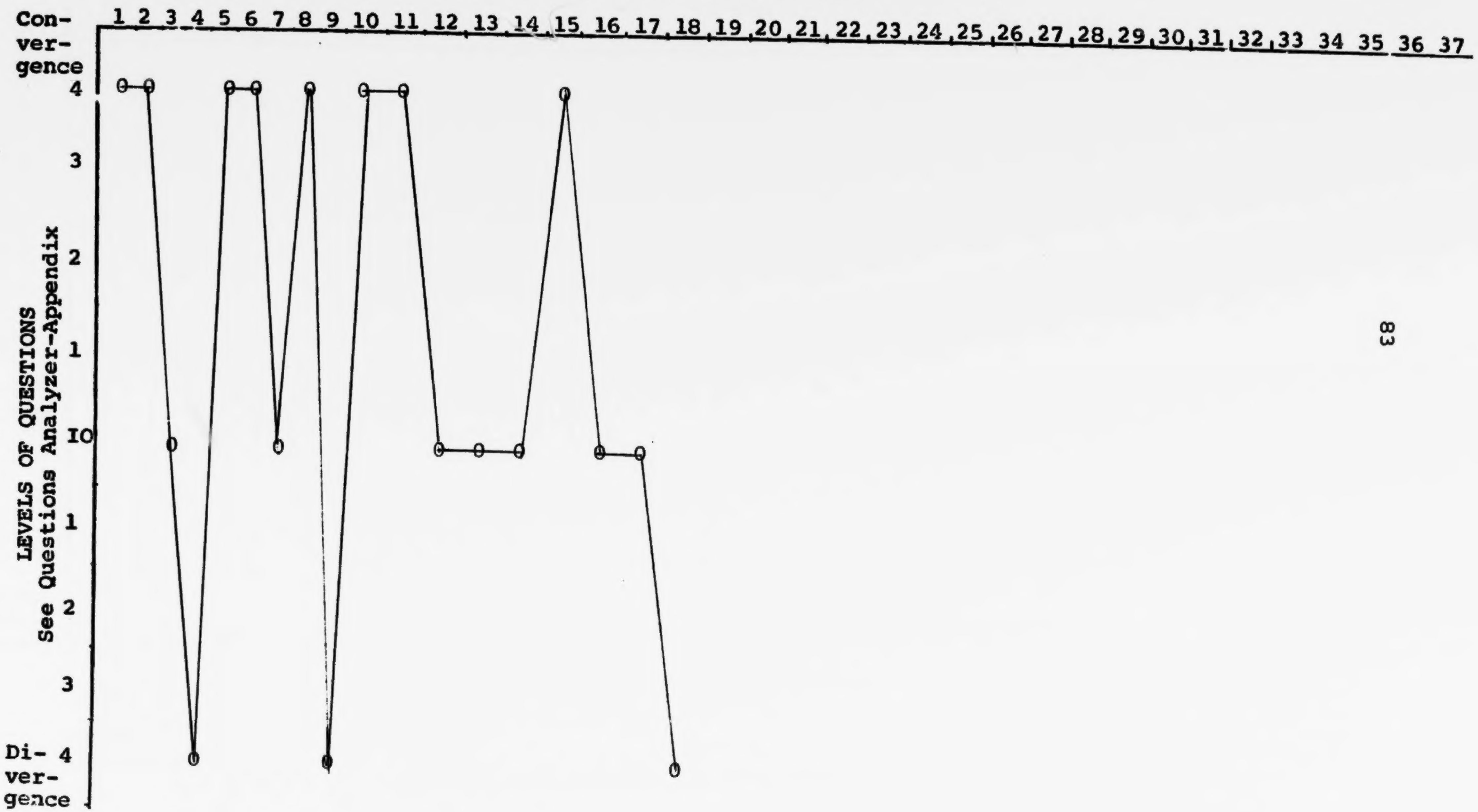
GRAPHIC PRESENTATION OF TAPE ANALYSIS

Teacher # 19
Grade 1

Time 14.1

Tape analysis #1 0
Tape analysis #2 X
Tape analysis #3 +

Questions by Order of Presentation



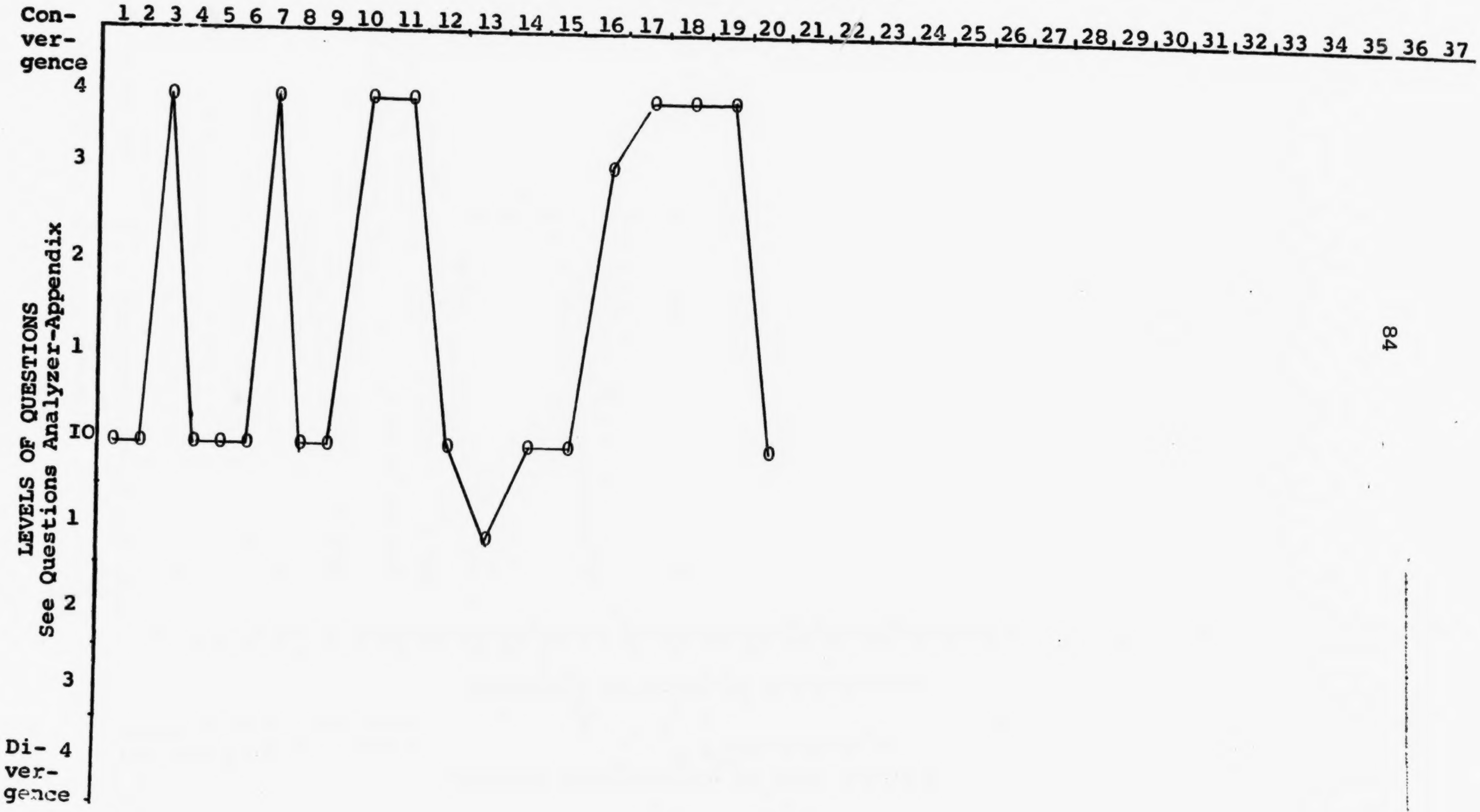
Teacher # 20
Grade 4

GRAPHIC PRESENTATION OF TAPE ANALYSIS

Time 15.0

Tape analysis #1 0
Tape analysis #2 X
Tape analysis #3 +

Questions by Order of Presentation



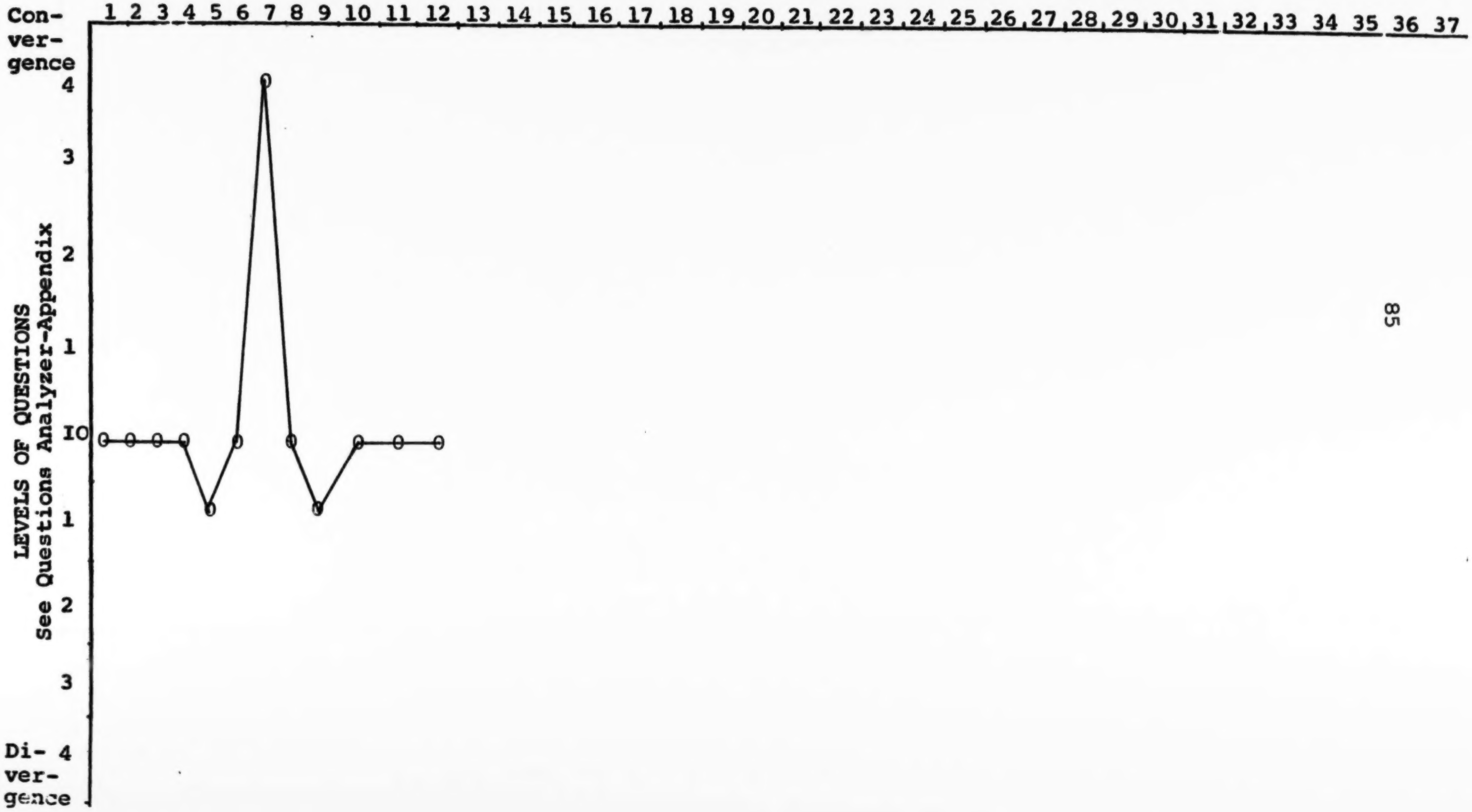
GRAPHIC PRESENTATION OF TAPE ANALYSIS

Teacher # 21
Grade 6

Time 15.0

Tape analysis #1 0
Tape analysis #2 X
Tape analysis #3 +

Questions by Order of Presentation



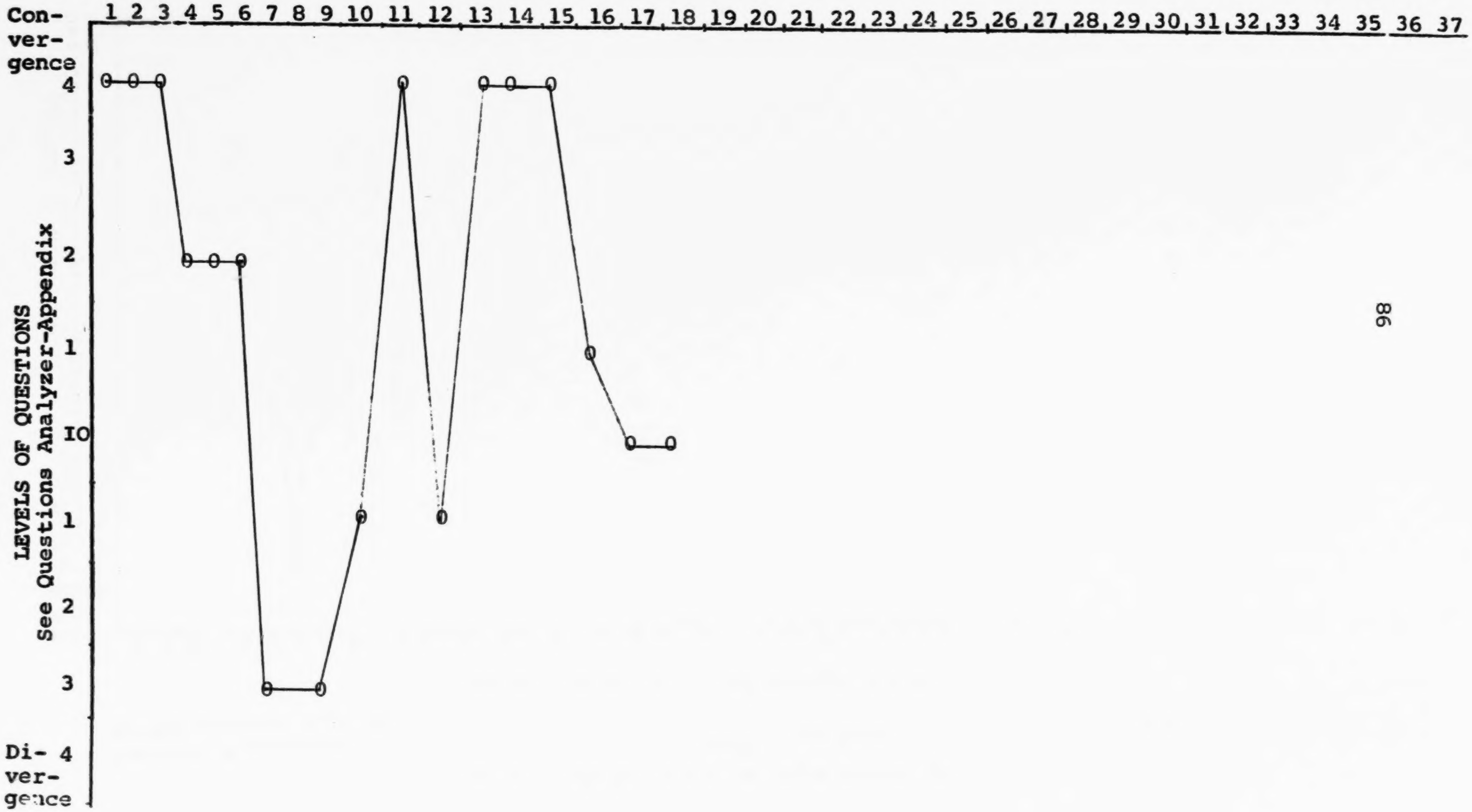
GRAPHIC PRESENTATION OF TAPE ANALYSIS

Teacher # 22
Grade 6

Time 15.0

Tape analysis #1 0
Tape analysis #2 X
Tape analysis #3 +

Questions by Order of Presentation



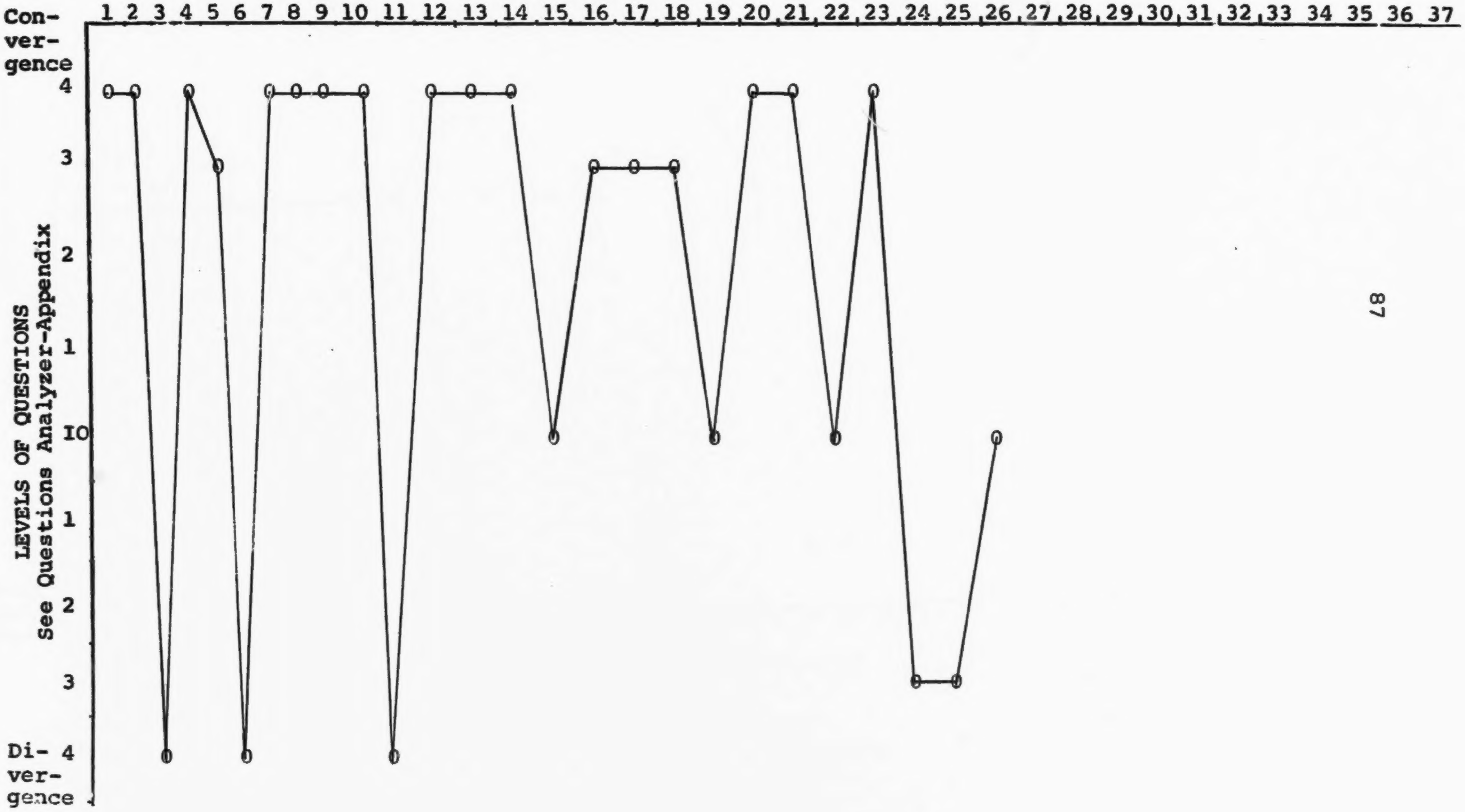
GRAPHIC PRESENTATION OF TAPE ANALYSIS

Teacher # 23
Grade 5

Time 15.0

Tape analysis #1 0
Tape analysis #2 X
Tape analysis #3 +

Questions by Order of Presentation



GRAPHIC PRESENTATION OF TAPE ANALYSIS

Teacher # 24
Grade 3

Time 15.0

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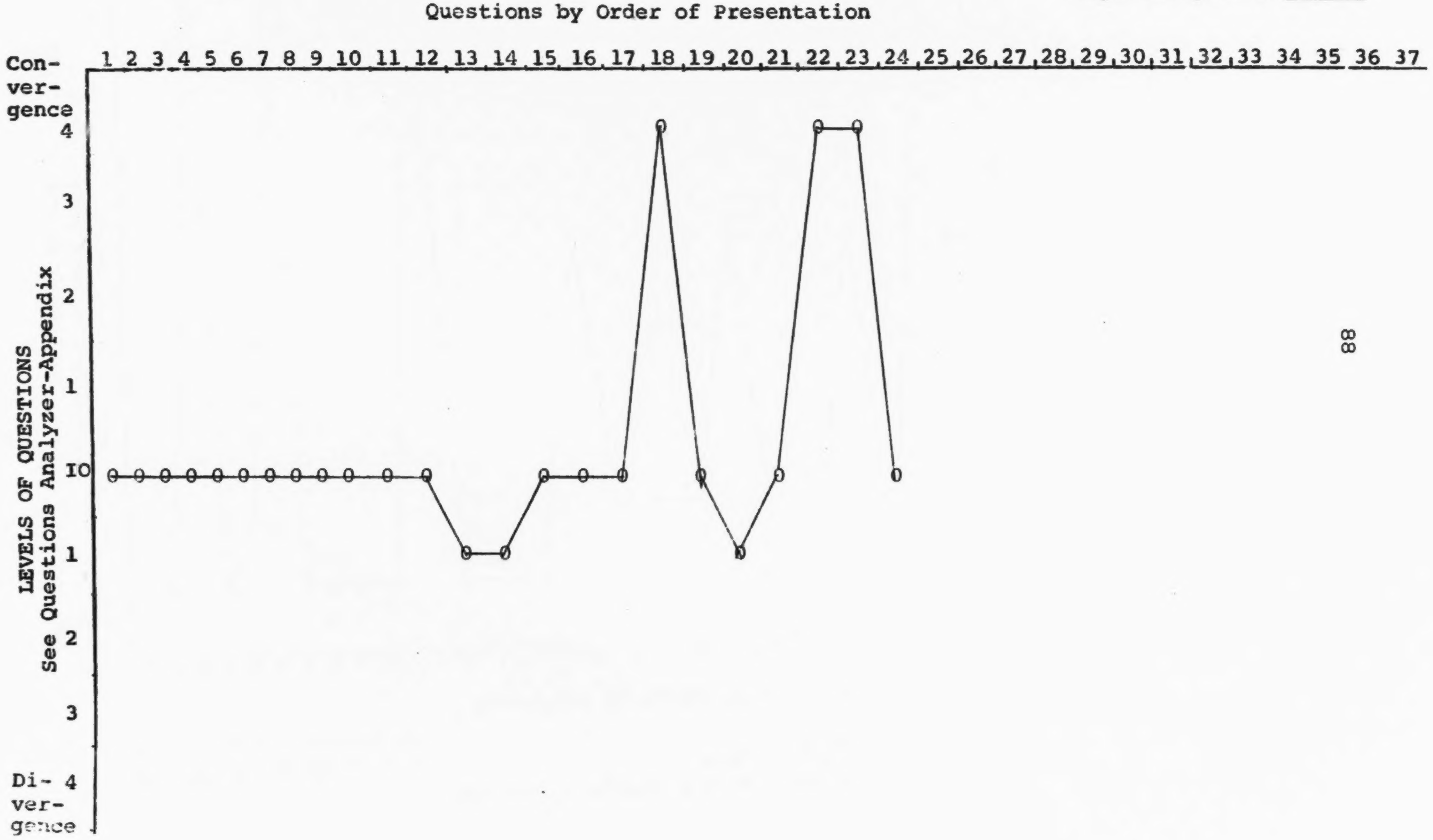
Tape analysis #3 +



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Teacher # 25
Grade 5
Time 15.0

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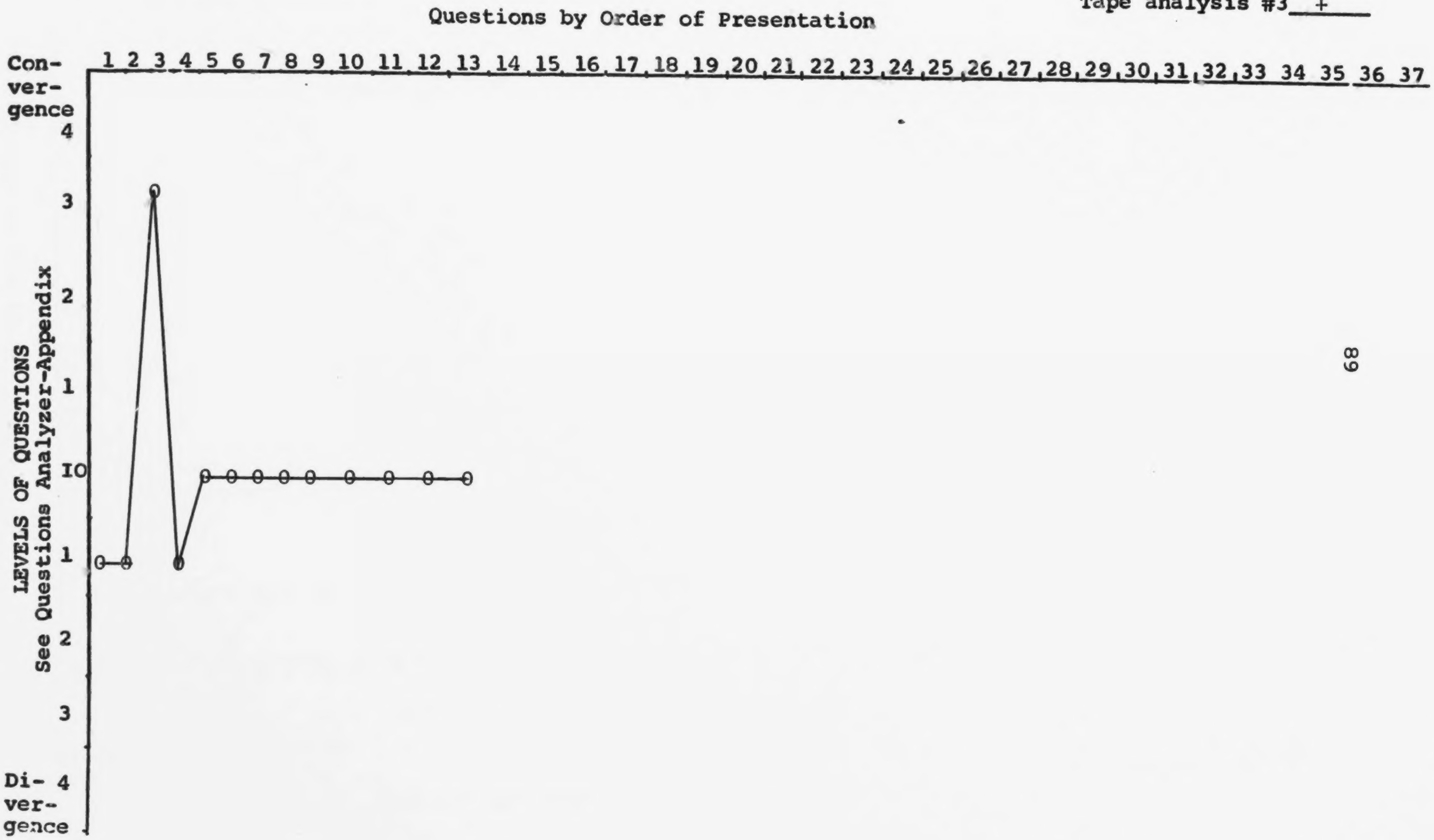
Tape analysis #3 +



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Teacher # 26
Grade 5
Time 13.5

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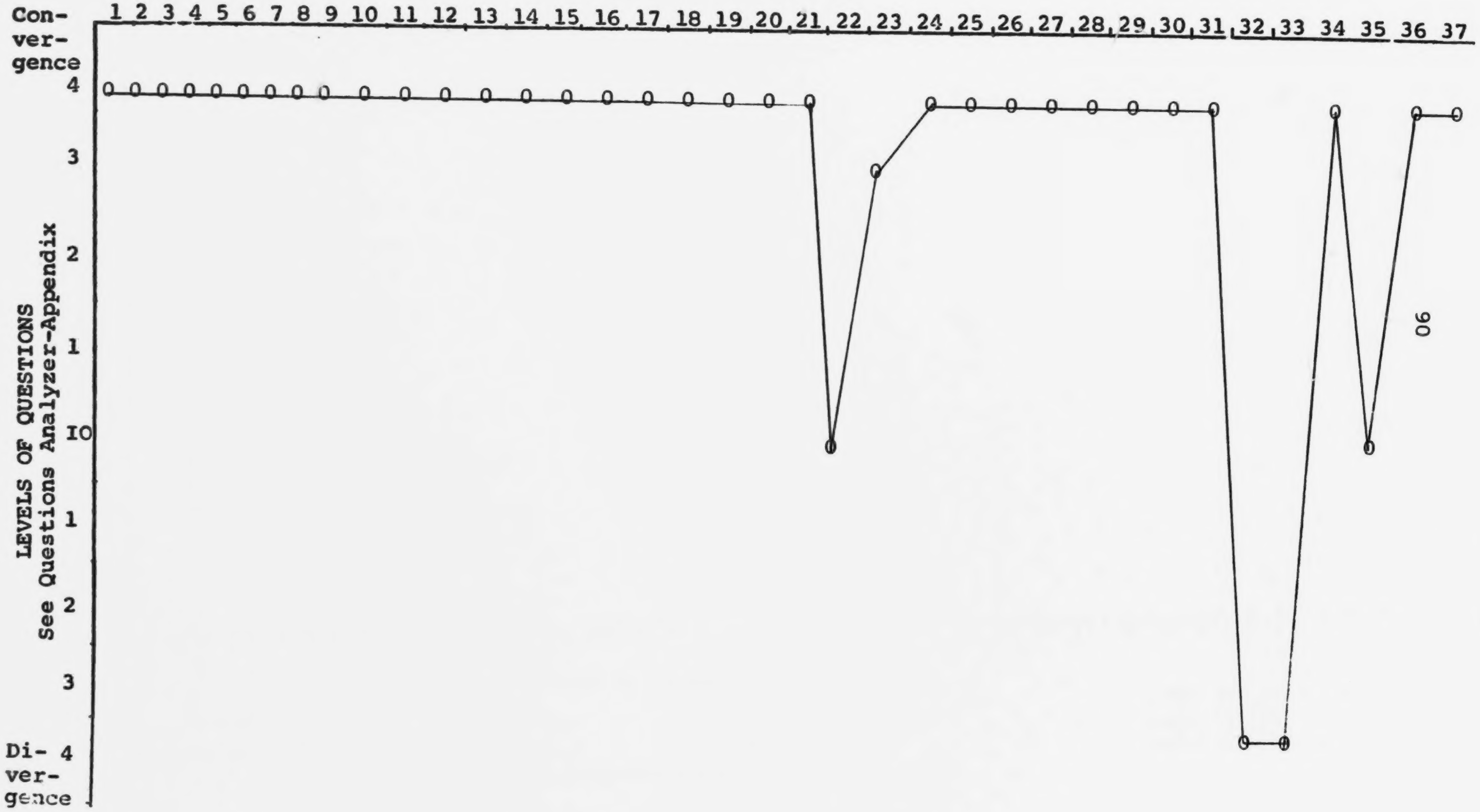
Tape analysis #3 +

Questions by Order of Presentation



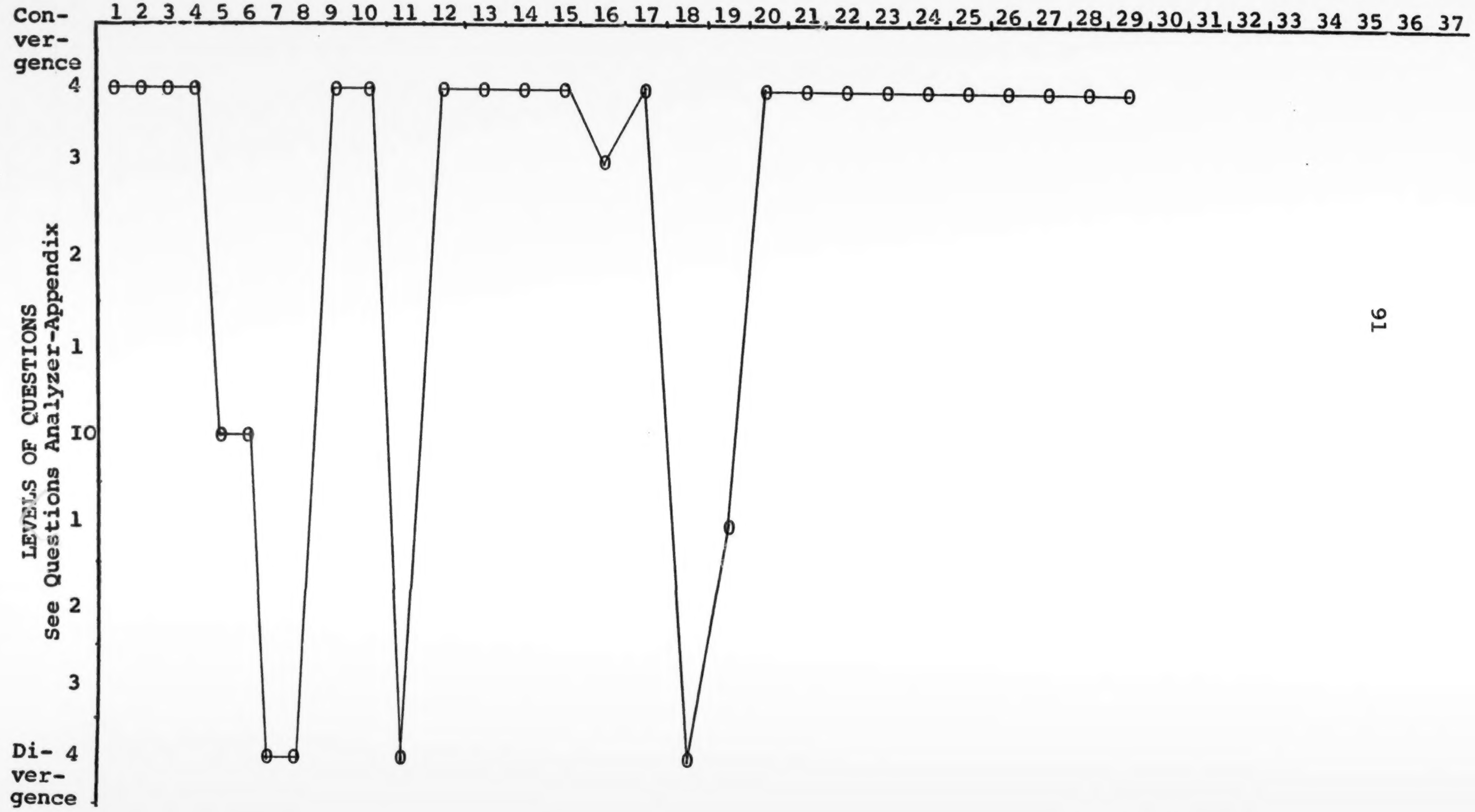
GRAPHIC PRESENTATION OF TAPE ANALYSIS

Teacher # 27
Grade 6

Time 15.0

Tape analysis #1 0
Tape analysis #2 X
Tape analysis #3 +

Questions by Order of Presentation



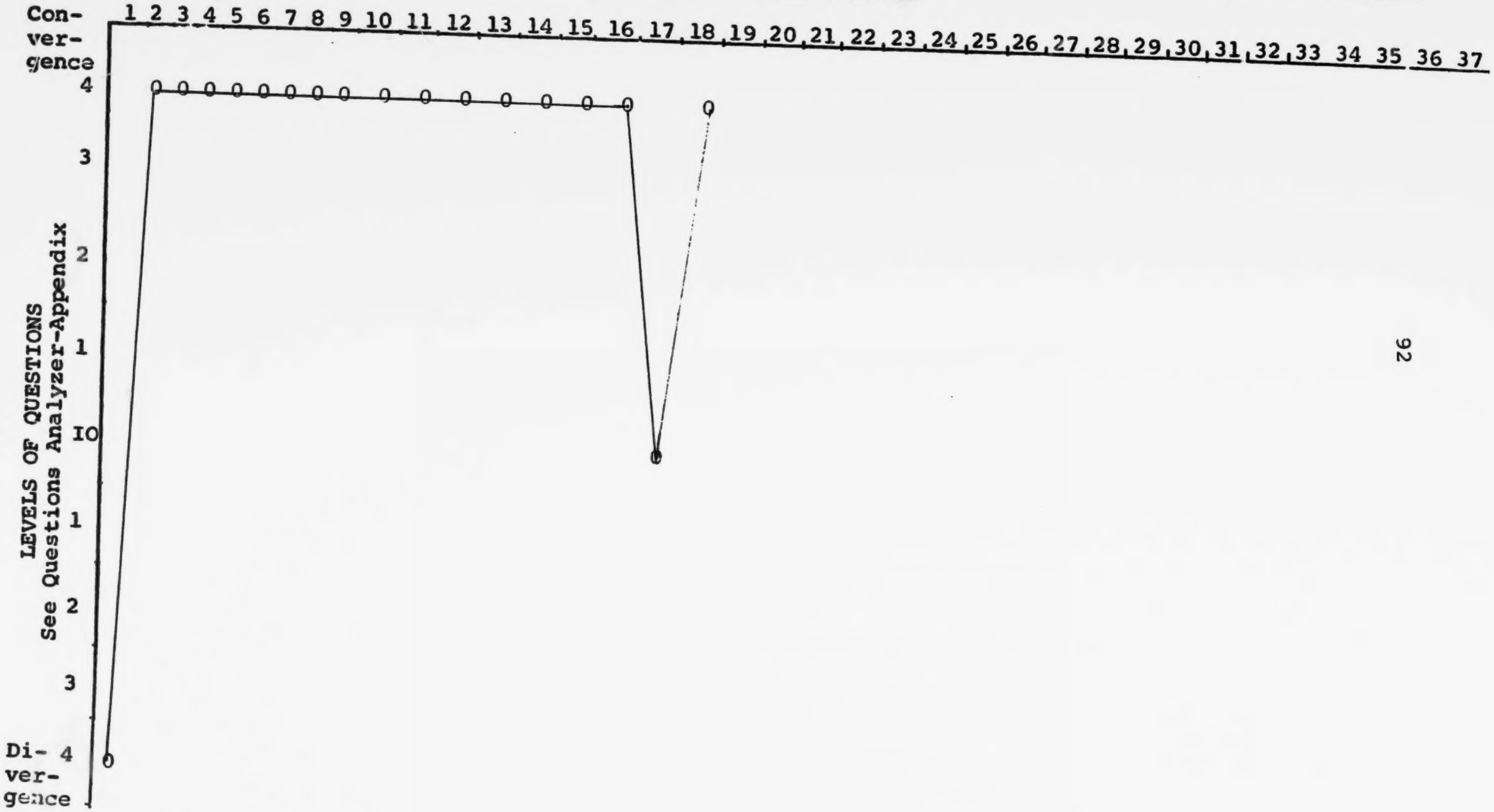
Teacher # 28
Grade 5 & 6

GRAPHIC PRESENTATION OF TAPE ANALYSIS

Time 9.1

Tape analysis #1 0
Tape analysis #2 X
Tape analysis #3 +

Questions by Order of Presentation



GRAPHIC PRESENTATION OF TAPE ANALYSIS

Teacher # 29
Grade 1

Time 9.0

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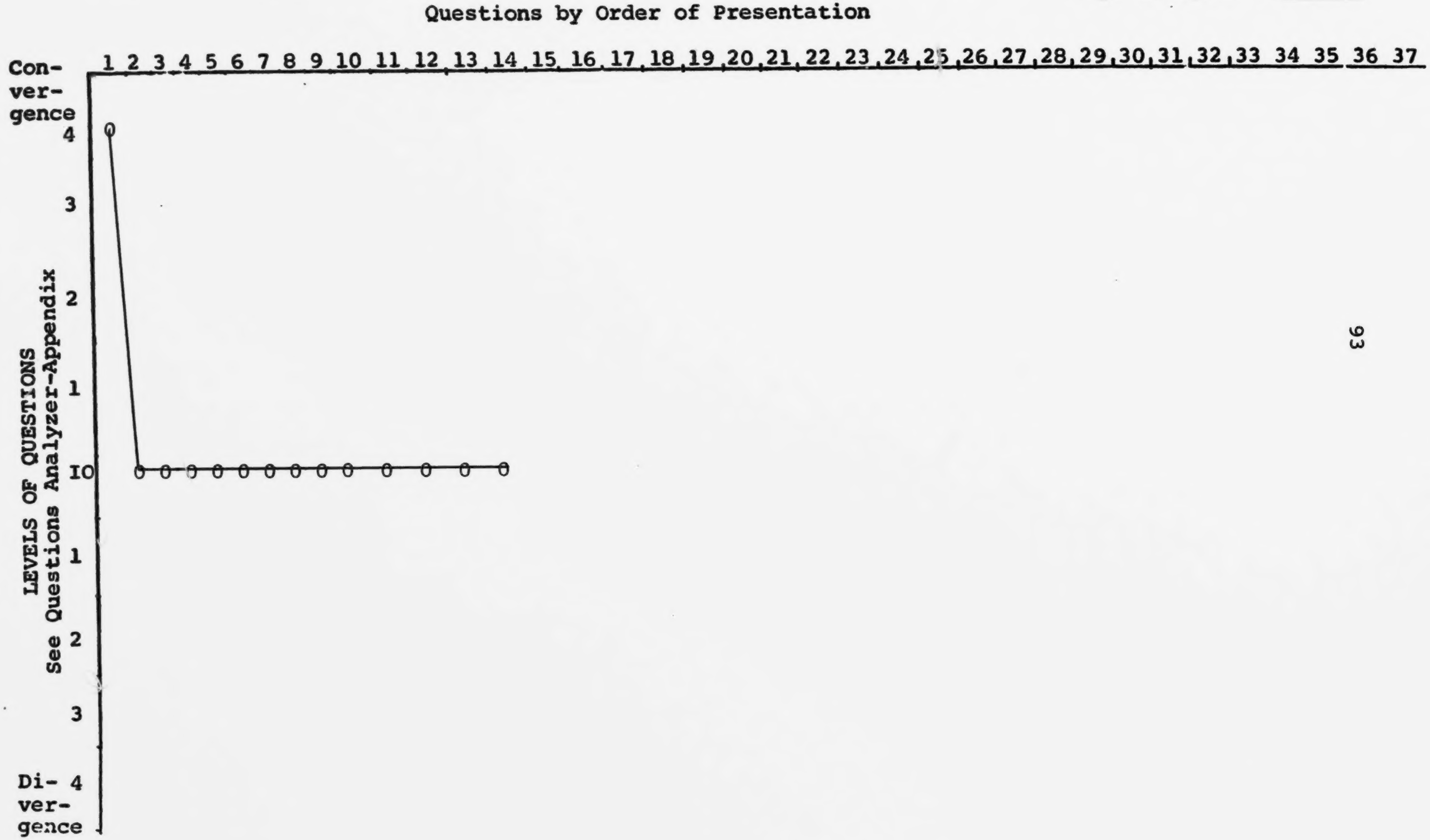
Tape analysis #3 +



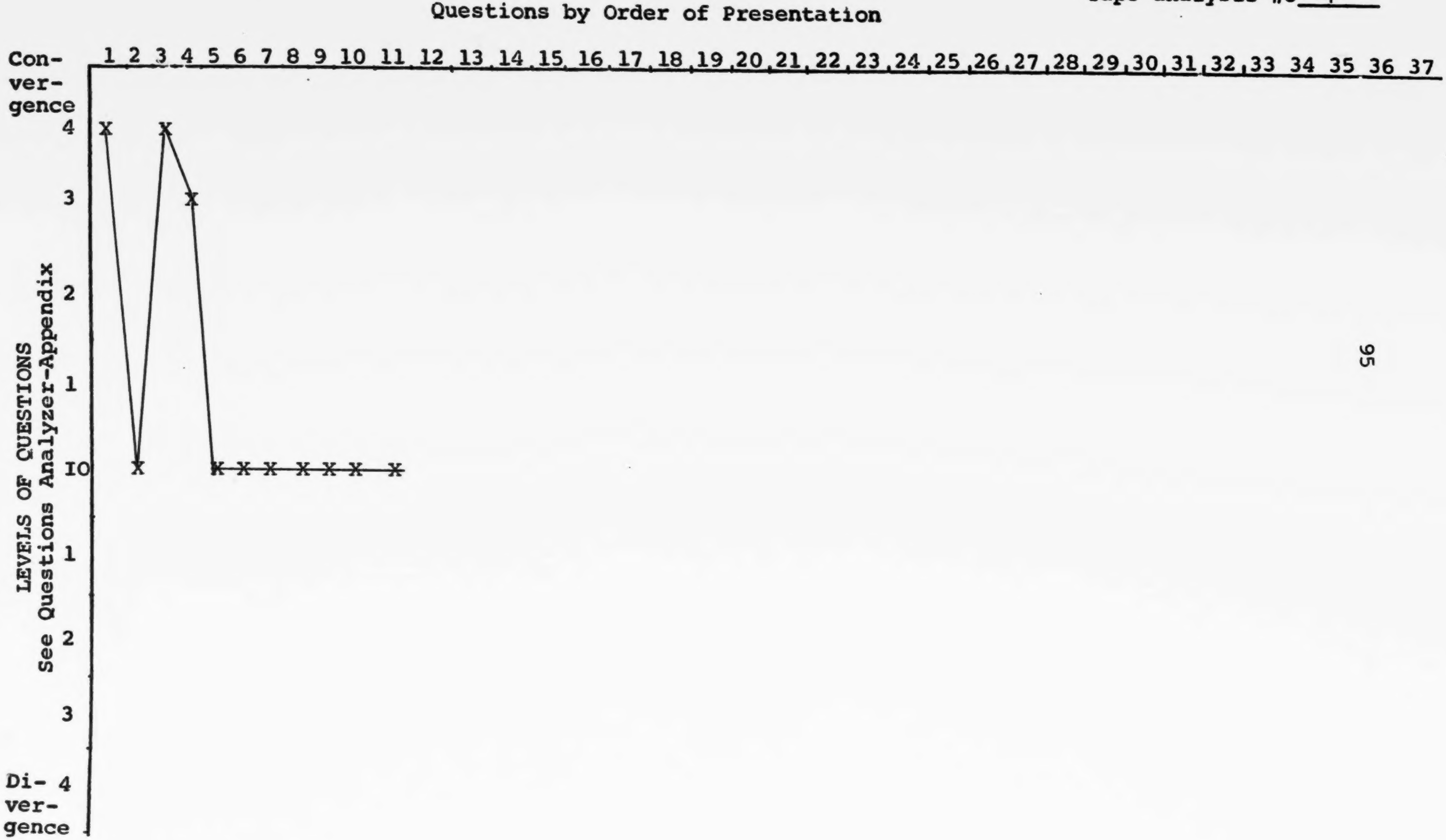
TAPE 2

GRAPHIC PRESENTATION OF TAPE ANALYSIS

Teacher # 1
Grade 5 & 6

Time 11.0

Tape analysis #1 0
Tape analysis #2 X
Tape analysis #3 +



GRAPHIC PRESENTATION OF TAPE ANALYSIS

Teacher # 2
Grade 3

Time 11.0

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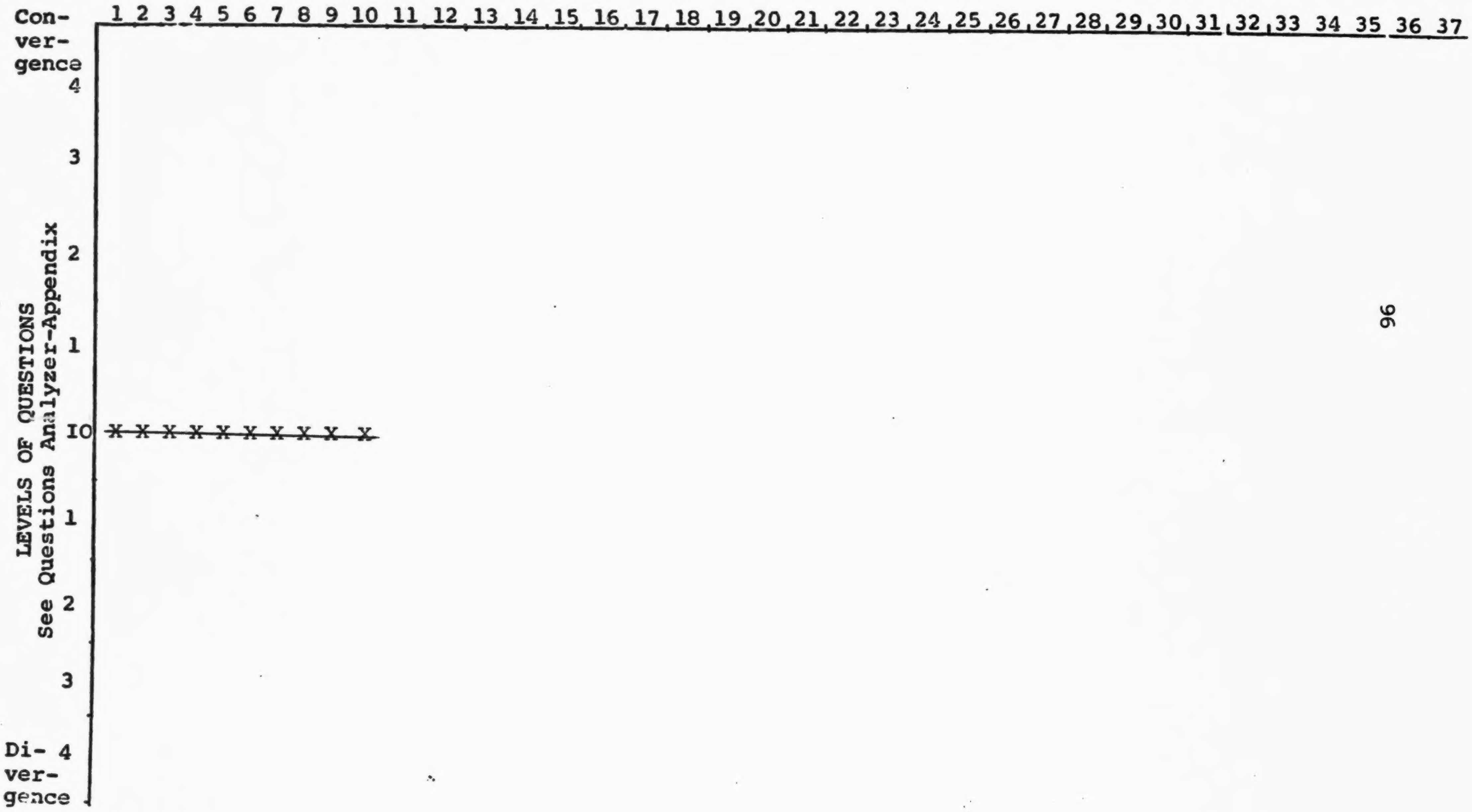
Tape analysis #3 +



GRAPHIC PRESENTATION OF TAPE ANALYSIS

Teacher # 3
Grade 5
Time 7.9

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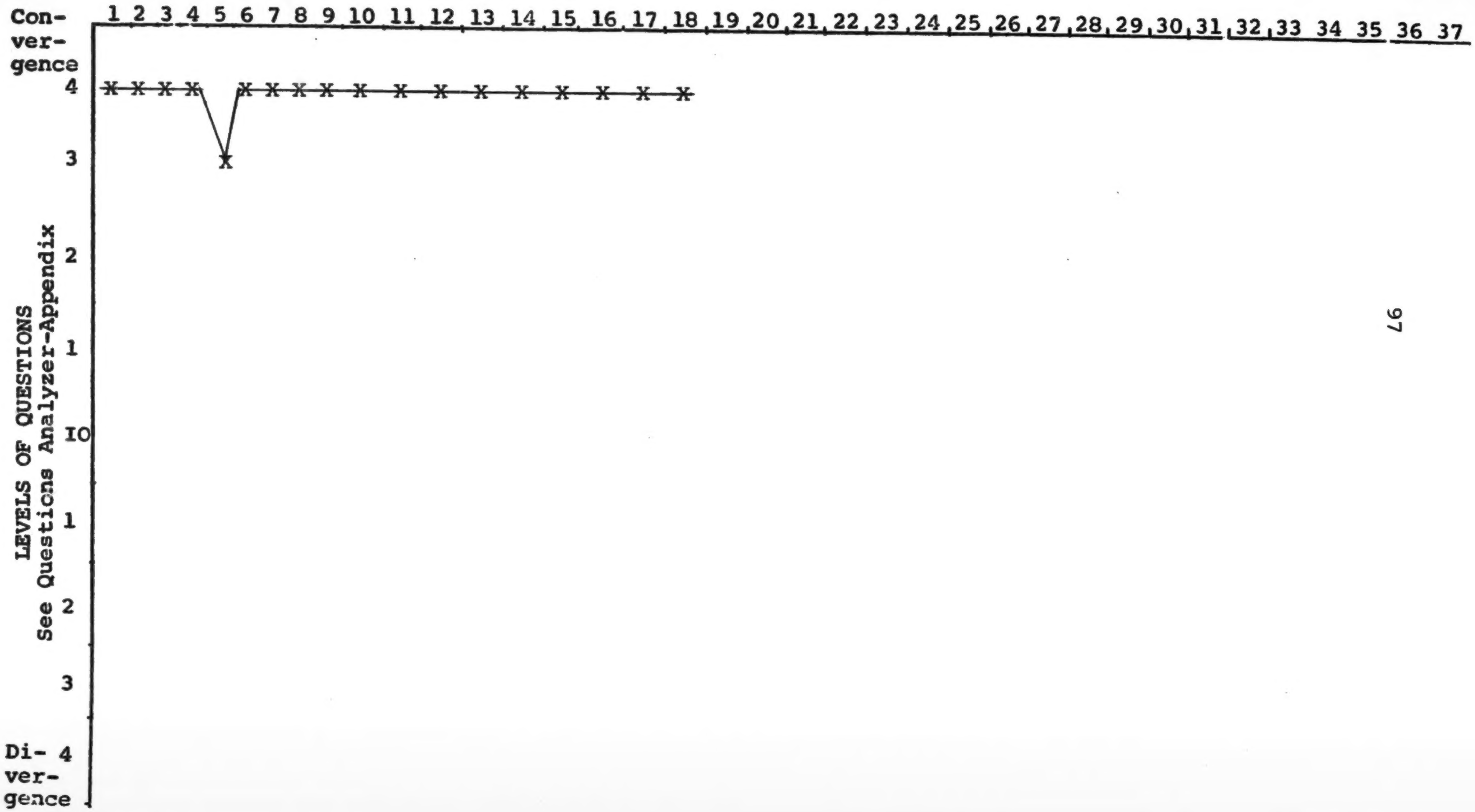
Tape analysis #3 +

Questions by Order of Presentation



GRAPHIC PRESENTATION OF TAPE ANALYSIS

Teacher # 4
Grade 6

Time 11.0

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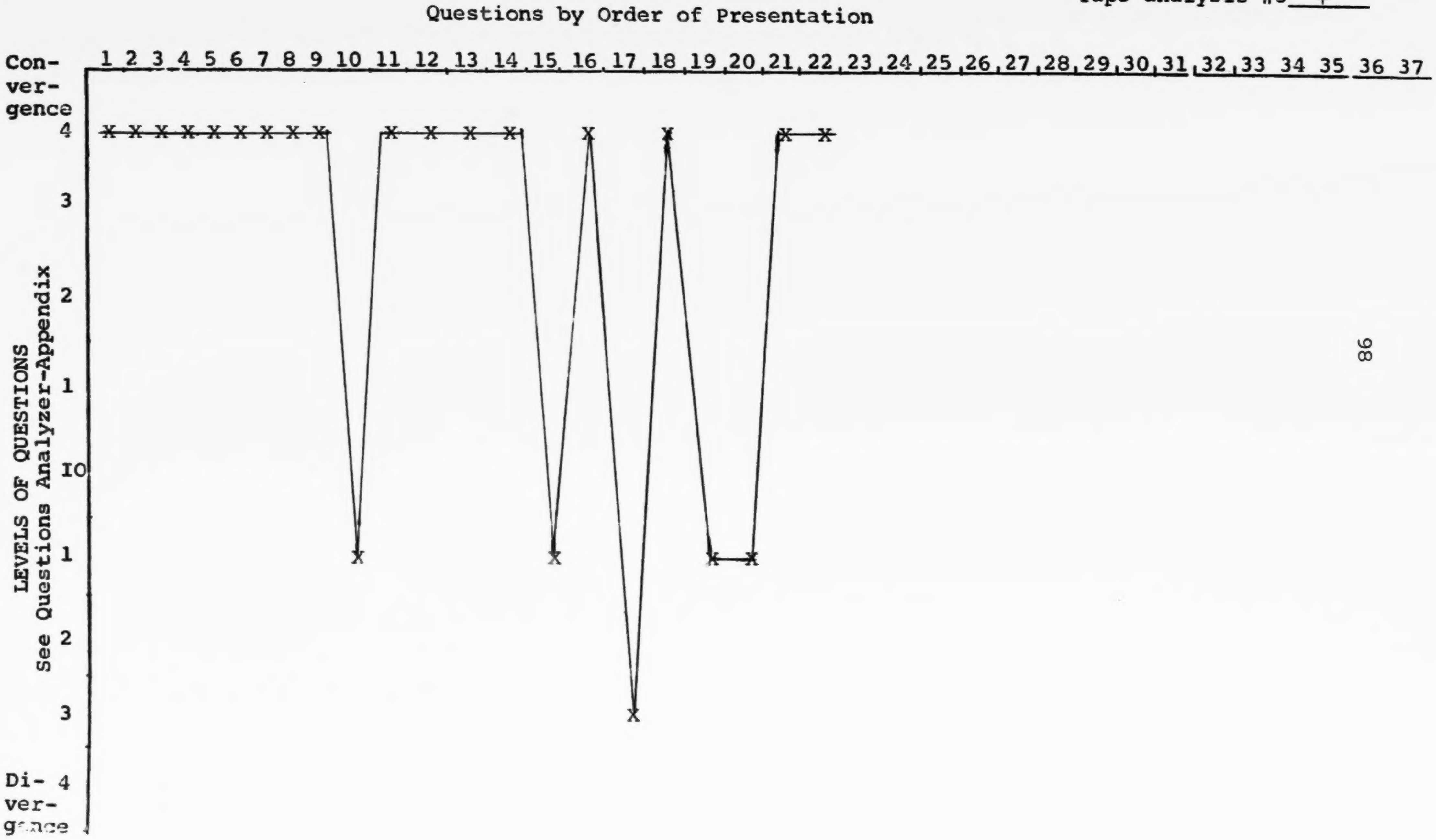
Tape analysis #3 +



GRAPHIC PRESENTATION OF TAPE ANALYSIS

Teacher # 5
Grade 5

Time 5.5

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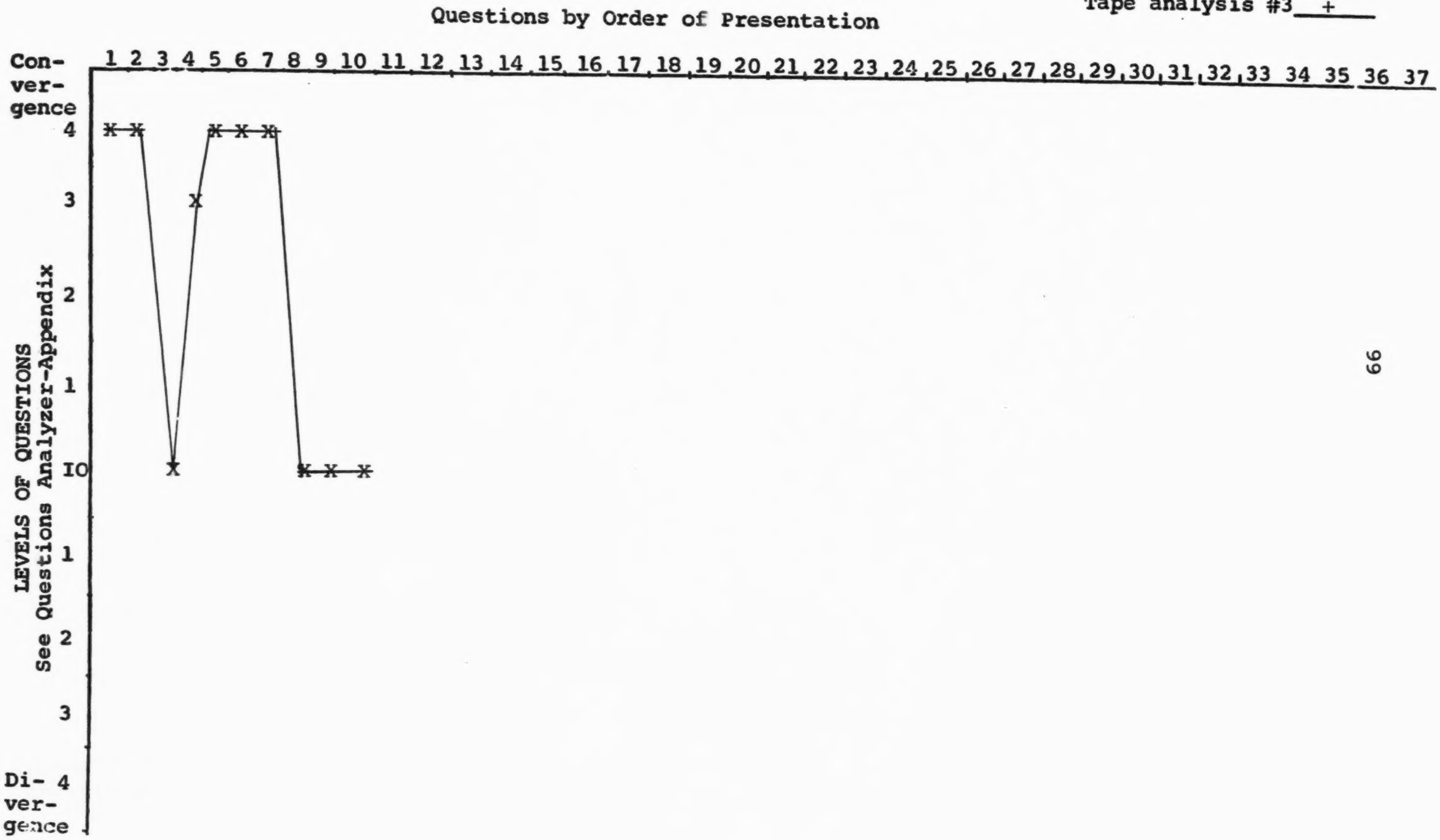
Tape analysis #3 +



GRAPHIC PRESENTATION OF TAPE ANALYSIS

Teacher # 6
Grade 4
Time 10.2

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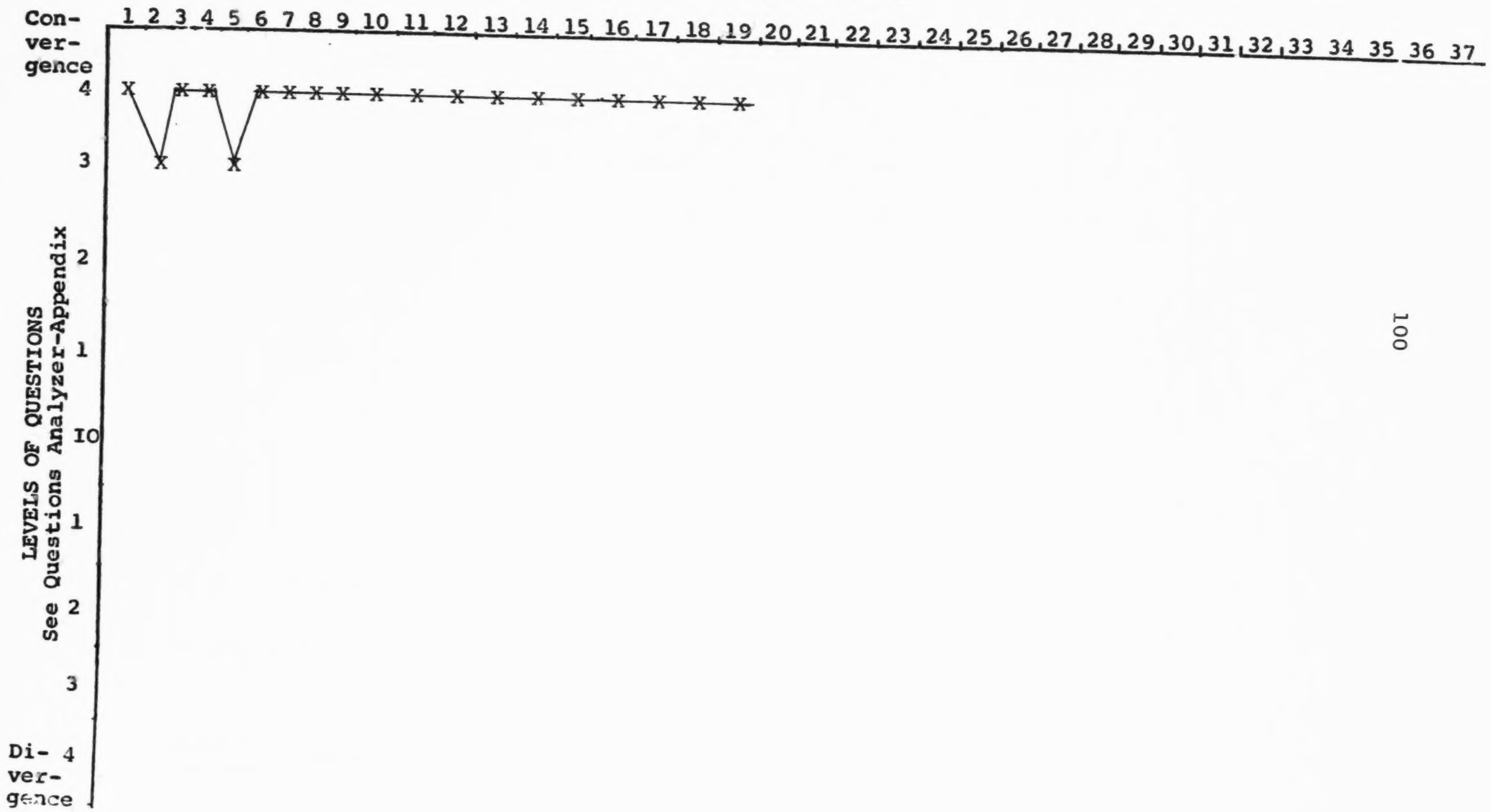
Tape analysis #2 X
Tape analysis #3 +

Questions by Order of Presentation



GRAPHIC PRESENTATION OF TAPE ANALYSIS

Teacher # 7
Grade 6
Time 8.5

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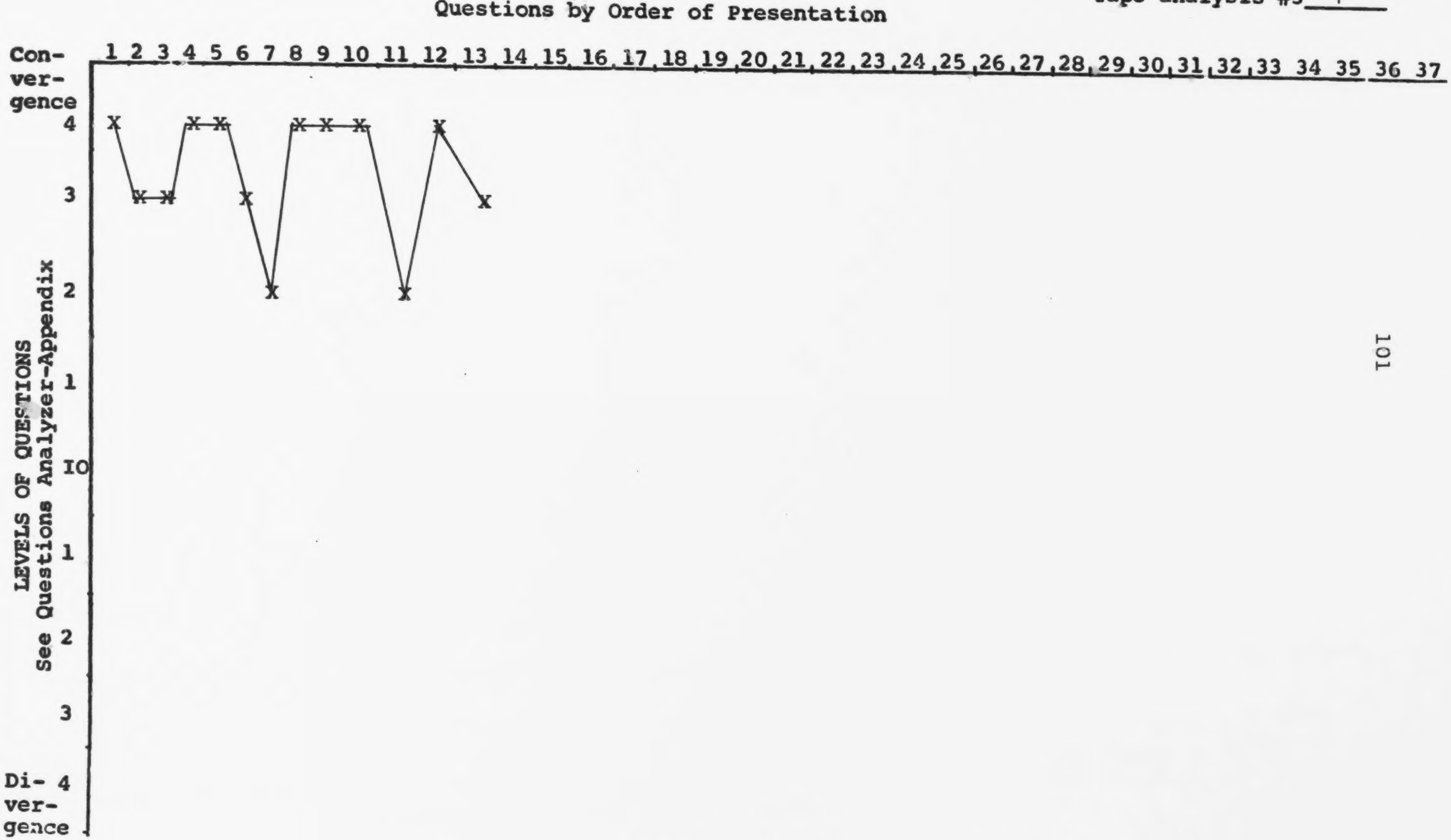
Tape analysis #2 X
Tape analysis #3 +



GRAPHIC PRESENTATION OF TAPE ANALYSIS

Teacher # 8
Grade 5

Time 8.2

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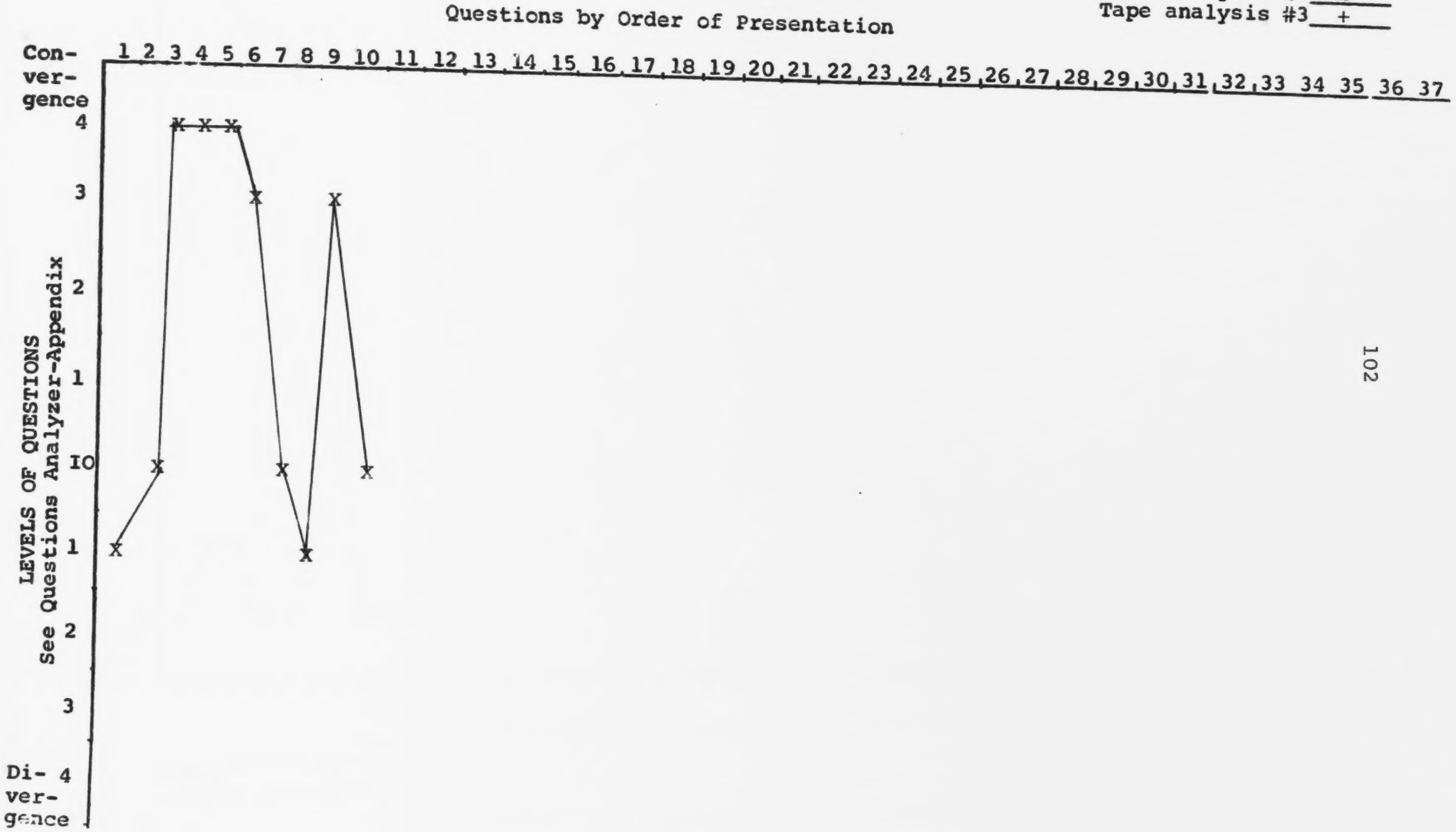
Tape analysis #2 X
Tape analysis #3 +



GRAPHIC PRESENTATION OF TAPE ANALYSIS

Teacher # 9
Grade 3
Time 9.5
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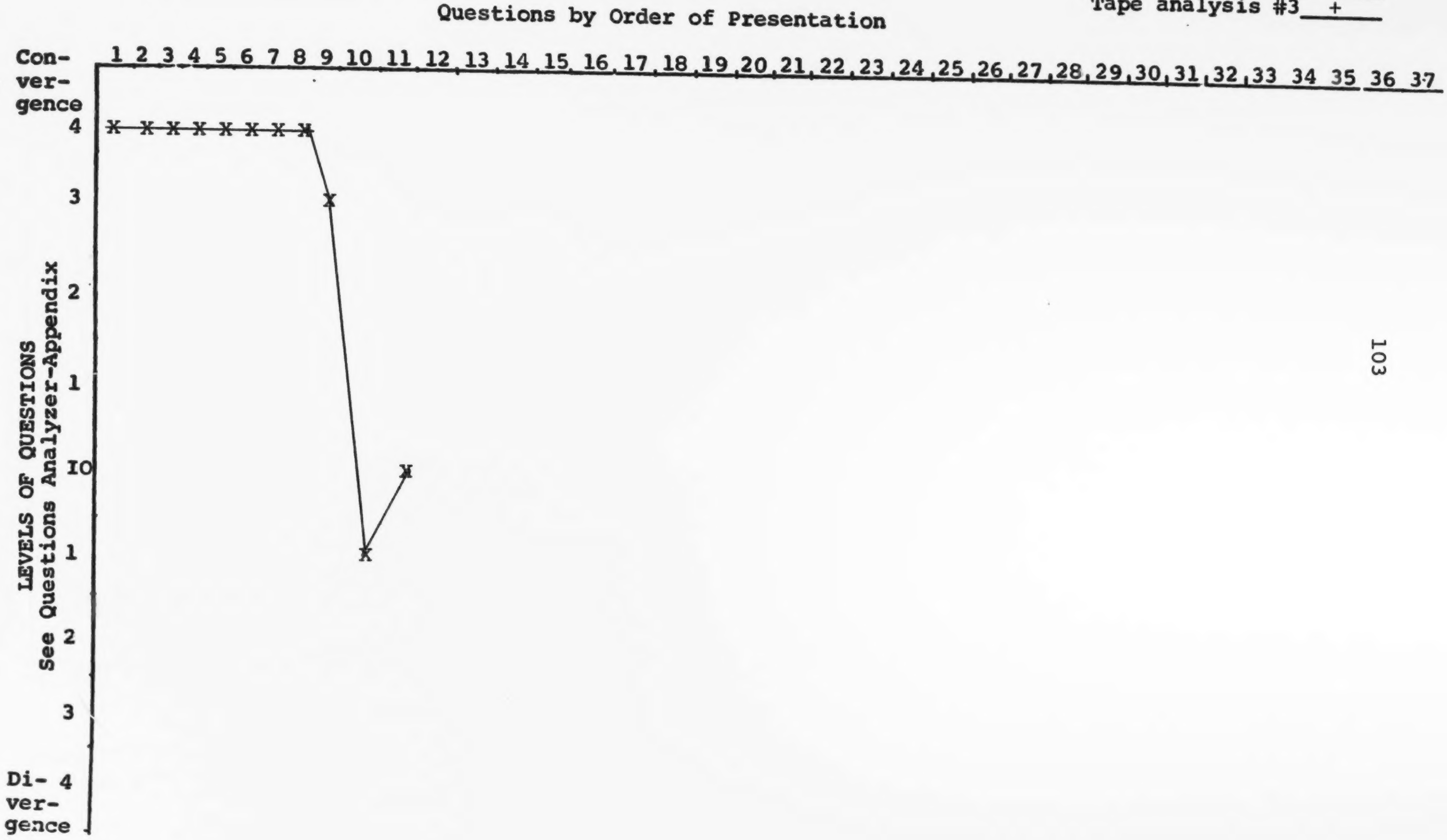
Tape analysis #2 X
Tape analysis #3 +



GRAPHIC PRESENTATION OF TAPE ANALYSIS

Teacher # 10
Grade 4
Time 8.9

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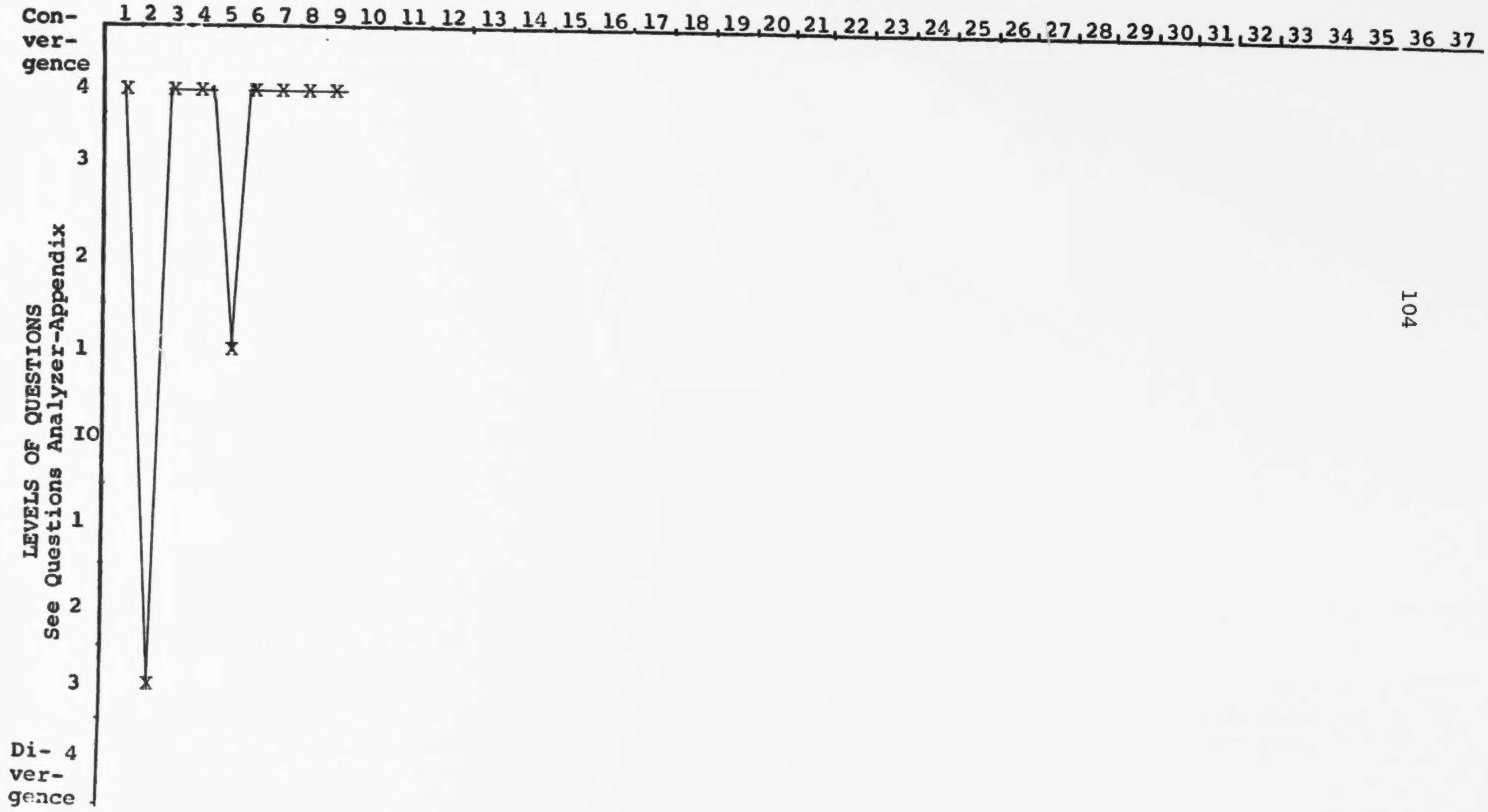
Tape analysis #3 +

Questions by Order of Presentation



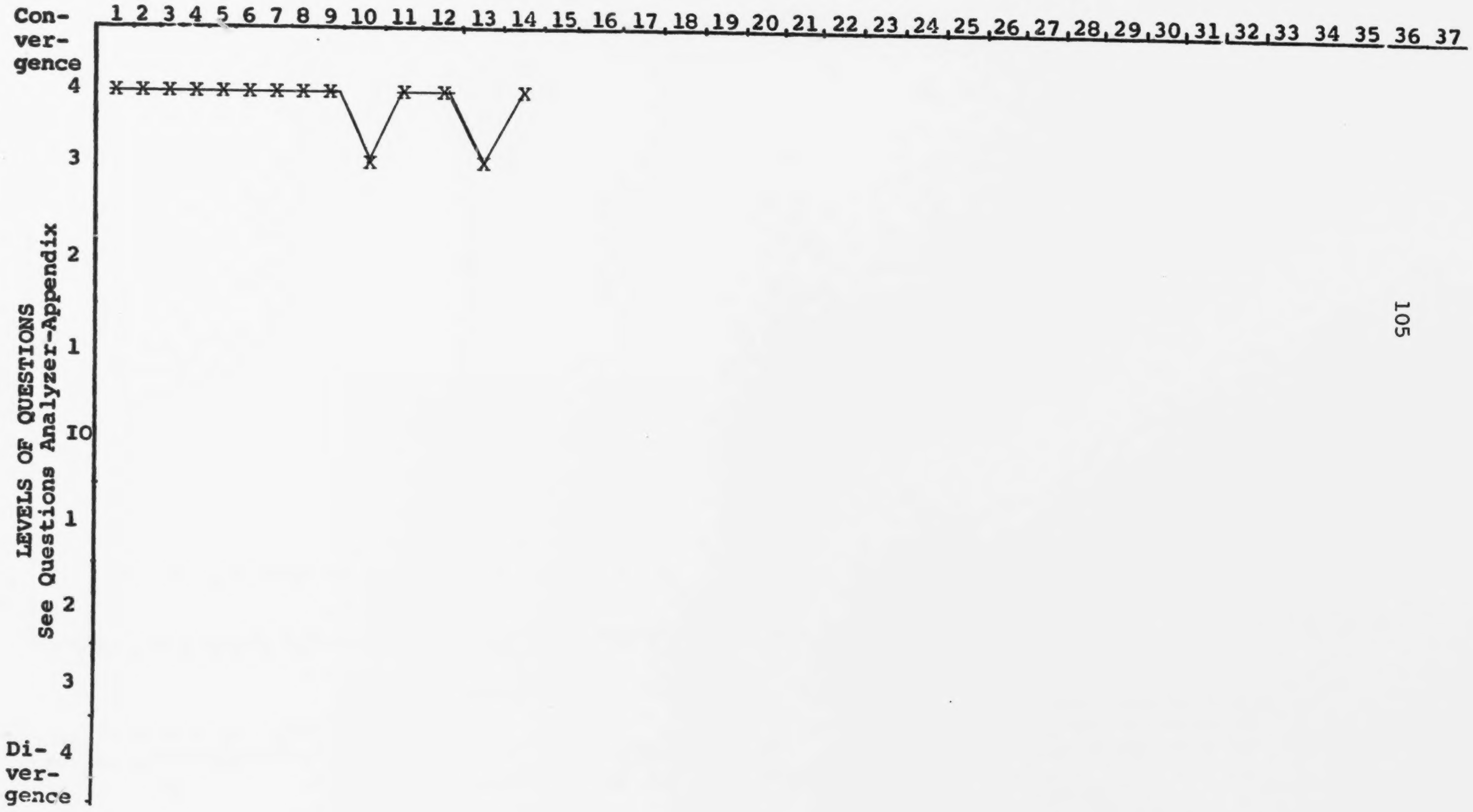
GRAPHIC PRESENTATION OF TAPE ANALYSIS

Teacher # 11
Grade 4

Time 8.0

Tape analysis #1 0
Tape analysis #2 X
Tape analysis #3 +

Questions by Order of Presentation



GRAPHIC PRESENTATION OF TAPE ANALYSIS

Teacher # 12

Grade 3

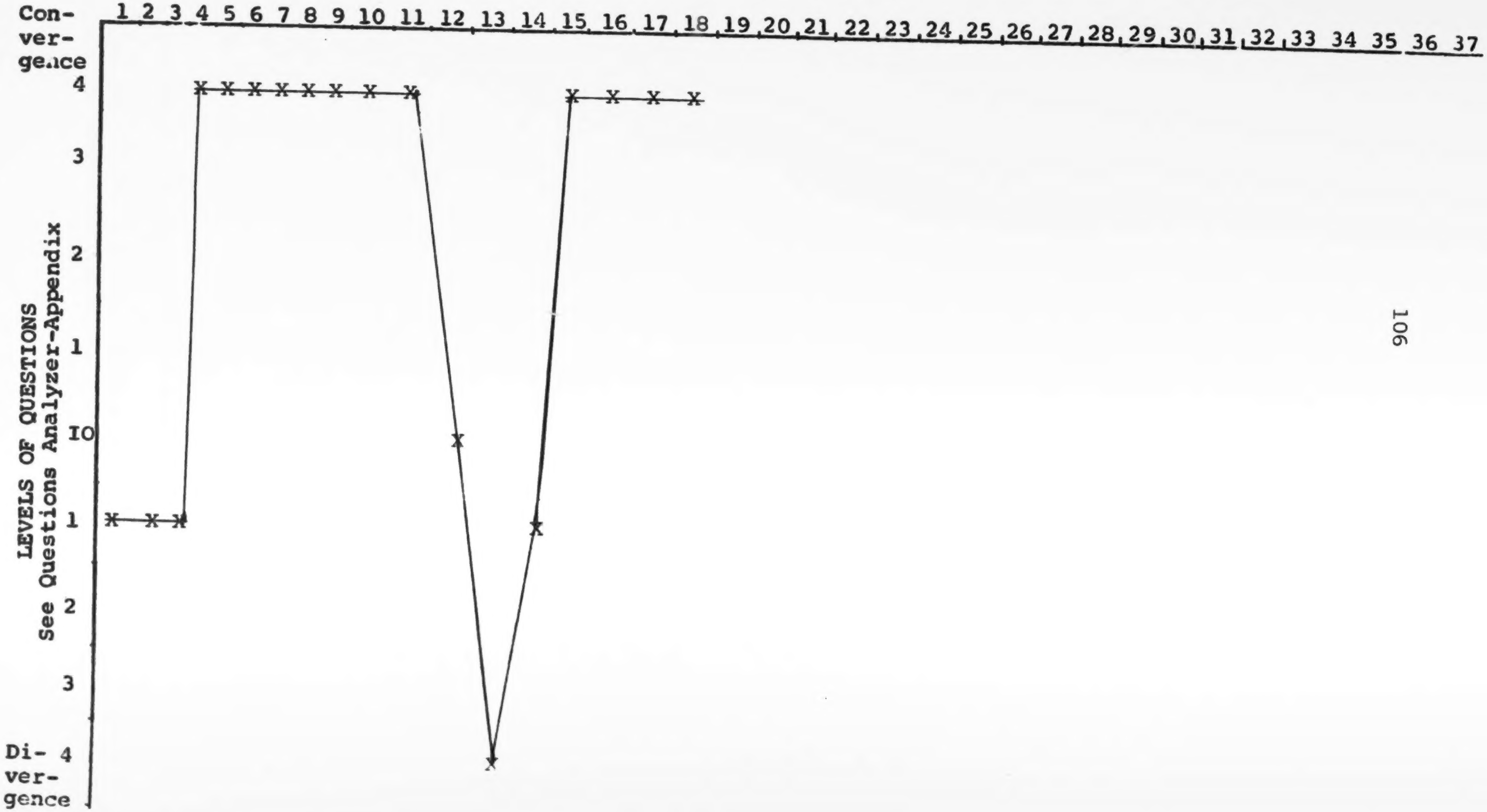
Time 11.0

Tape analysis #1 0

Tape analysis #2 X

Tape analysis #3 +

Questions by Order of Presentation



GRAPHIC PRESENTATION OF TAPE ANALYSIS

Teacher #__13________
Grade____4________

Time___11.0__

Tape analysis #1__0___
Tape analysis #2__X___
Tape analysis #3__+___

Questions by Order of Presentation

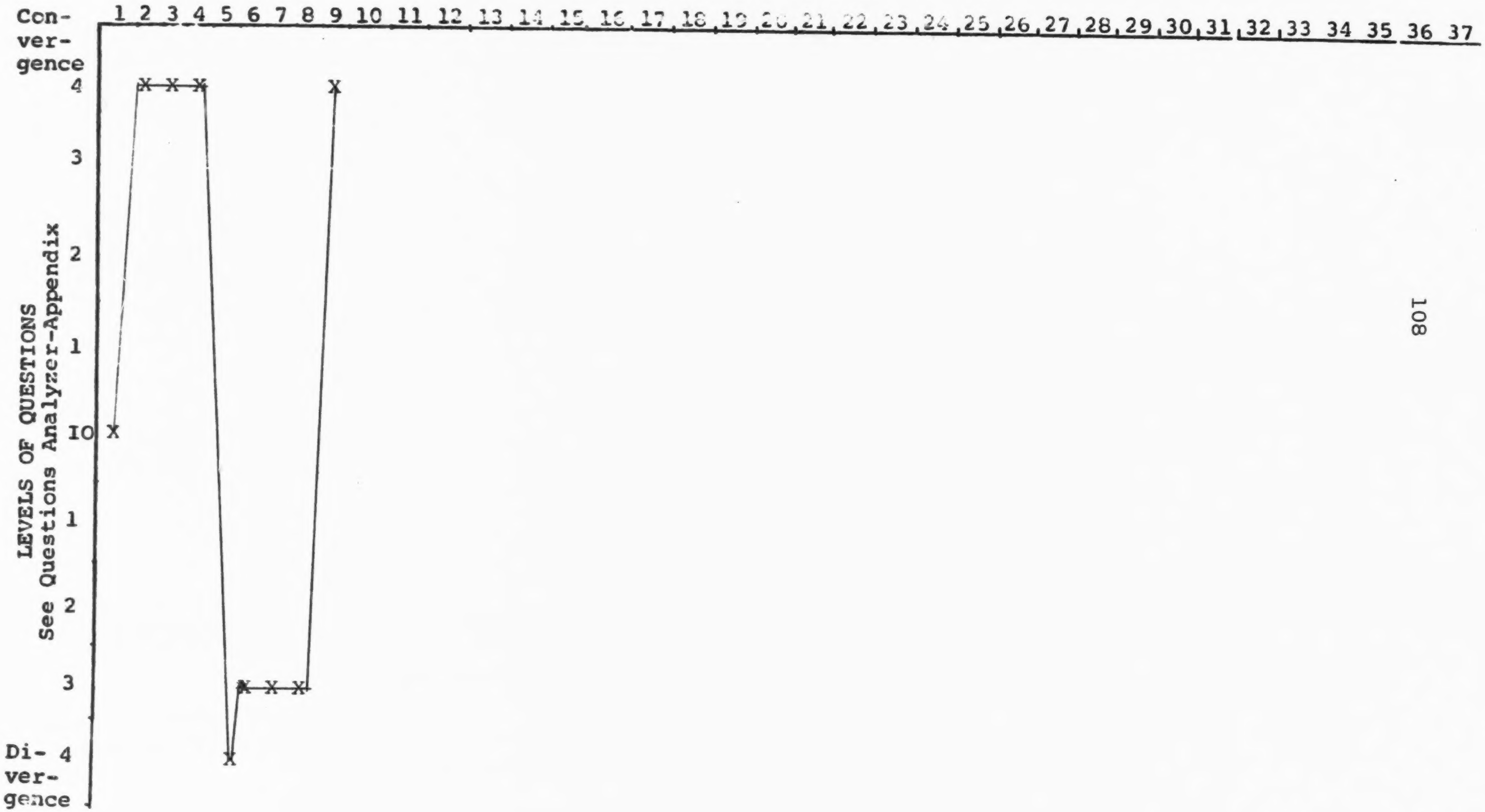
GRAPHIC PRESENTATION OF TAPE ANALYSIS

Teacher # 15
Grade 2

Time 10.0

Tape analysis #1 0
Tape analysis #2 X
Tape analysis #3 +

Questions by Order of Presentation



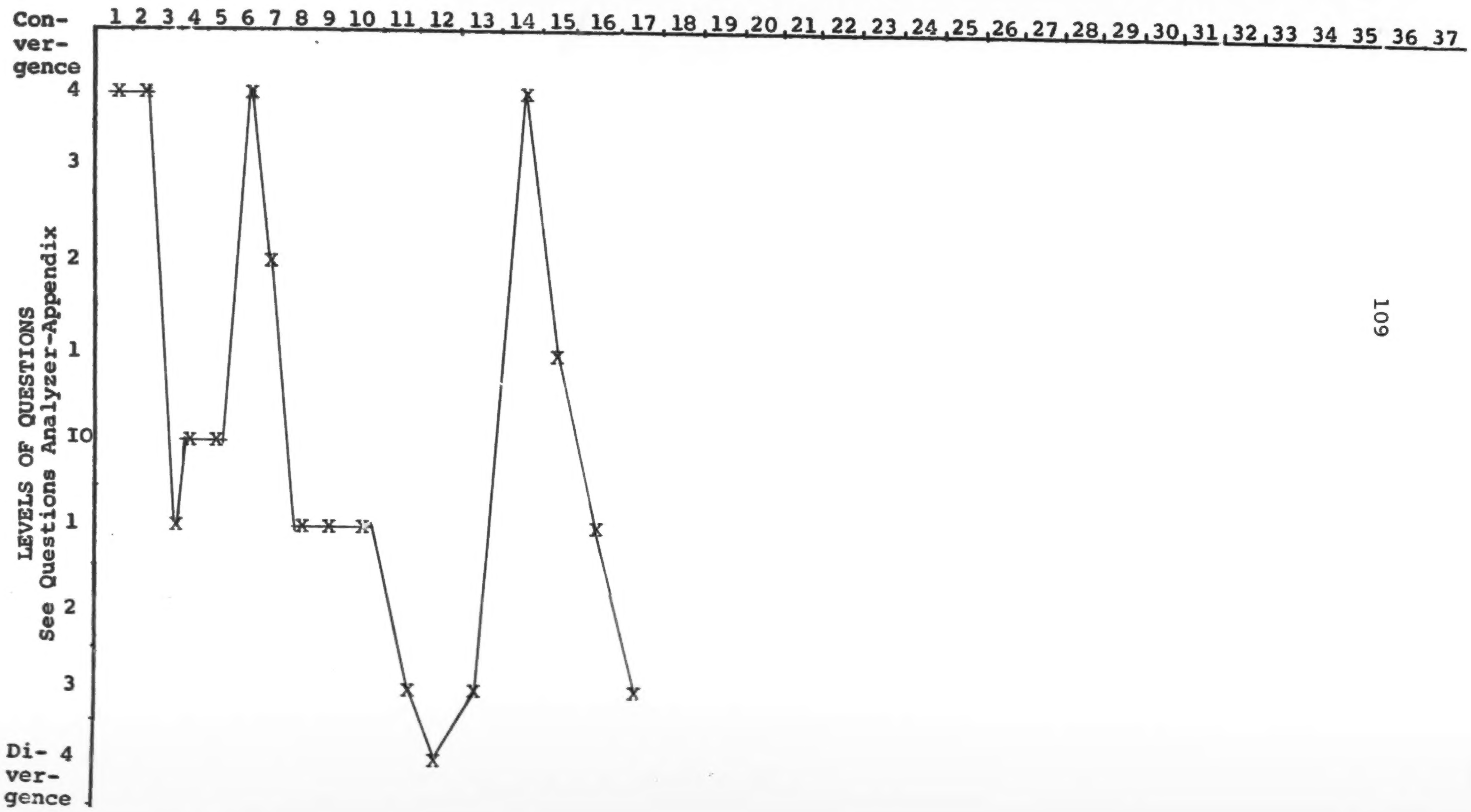
GRAPHIC PRESENTATION OF TAPE ANALYSIS

Teacher # 16
Grade 5

Time 11.0

Tape analysis #1 0
Tape analysis #2 X
Tape analysis #3 +

Questions by Order of Presentation

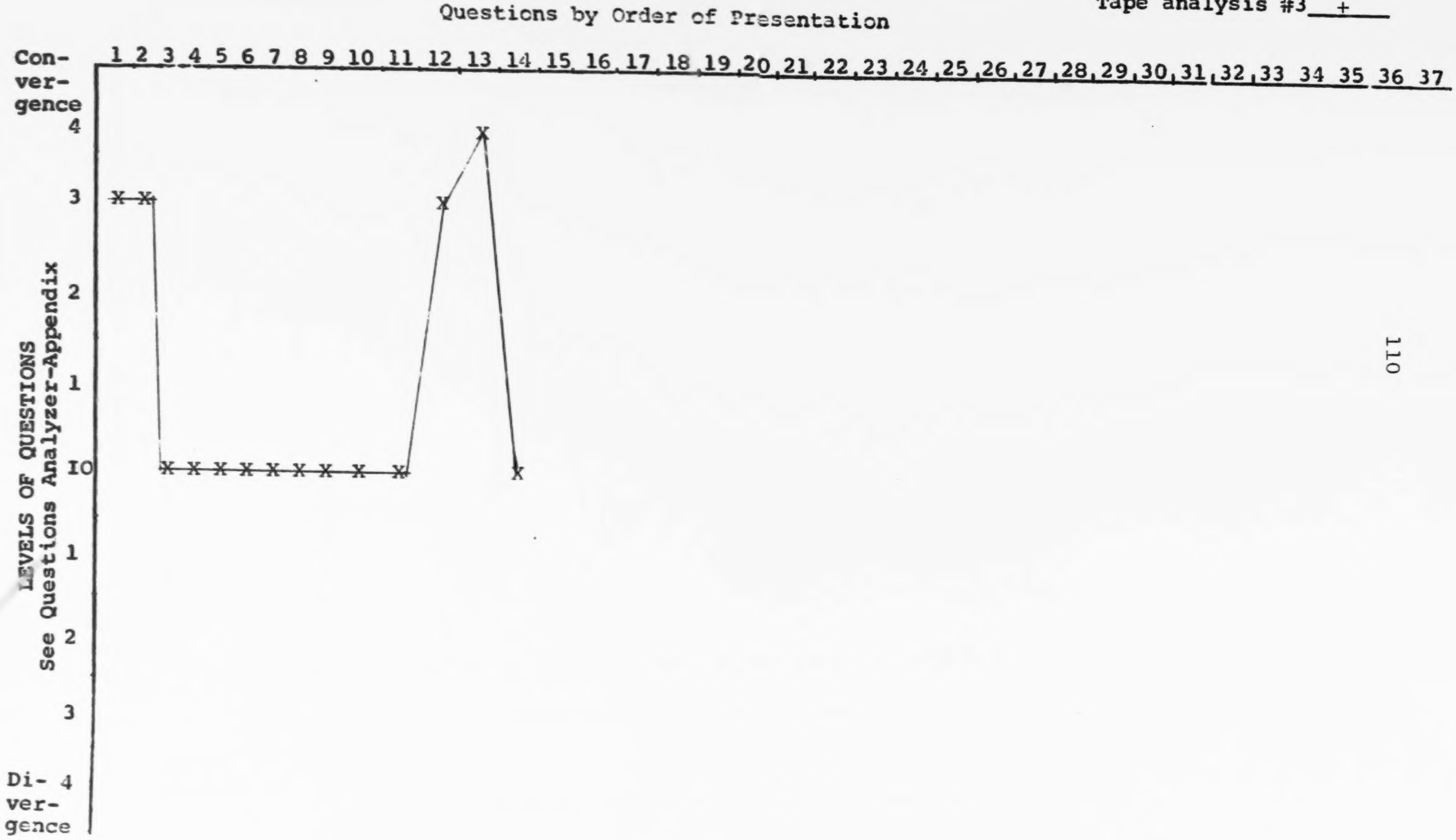


GRAPHIC PRESENTATION OF TAPE ANALYSIS

Teacher # 17
Grade 6

Time 15.0

Tape analysis #1 0
Tape analysis #2 X
Tape analysis #3 +

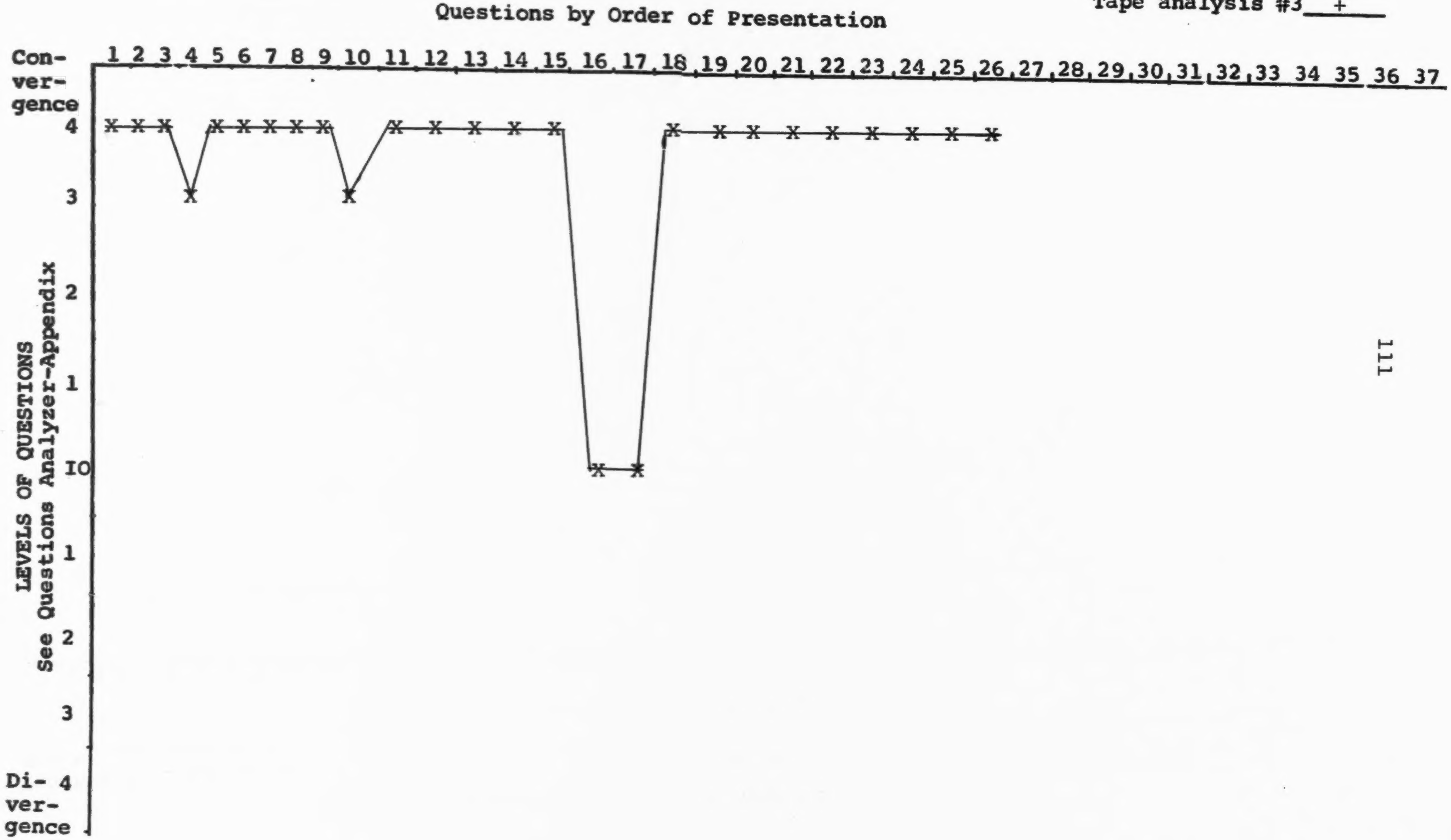


GRAPHIC PRESENTATION OF TAPE ANALYSIS

Teacher # 18
Grade 3

Time 14.8

Tape analysis #1 0
Tape analysis #2 X
Tape analysis #3 +



GRAPHIC PRESENTATION OF TAPE ANALYSIS

Teacher # 19

Grade 1

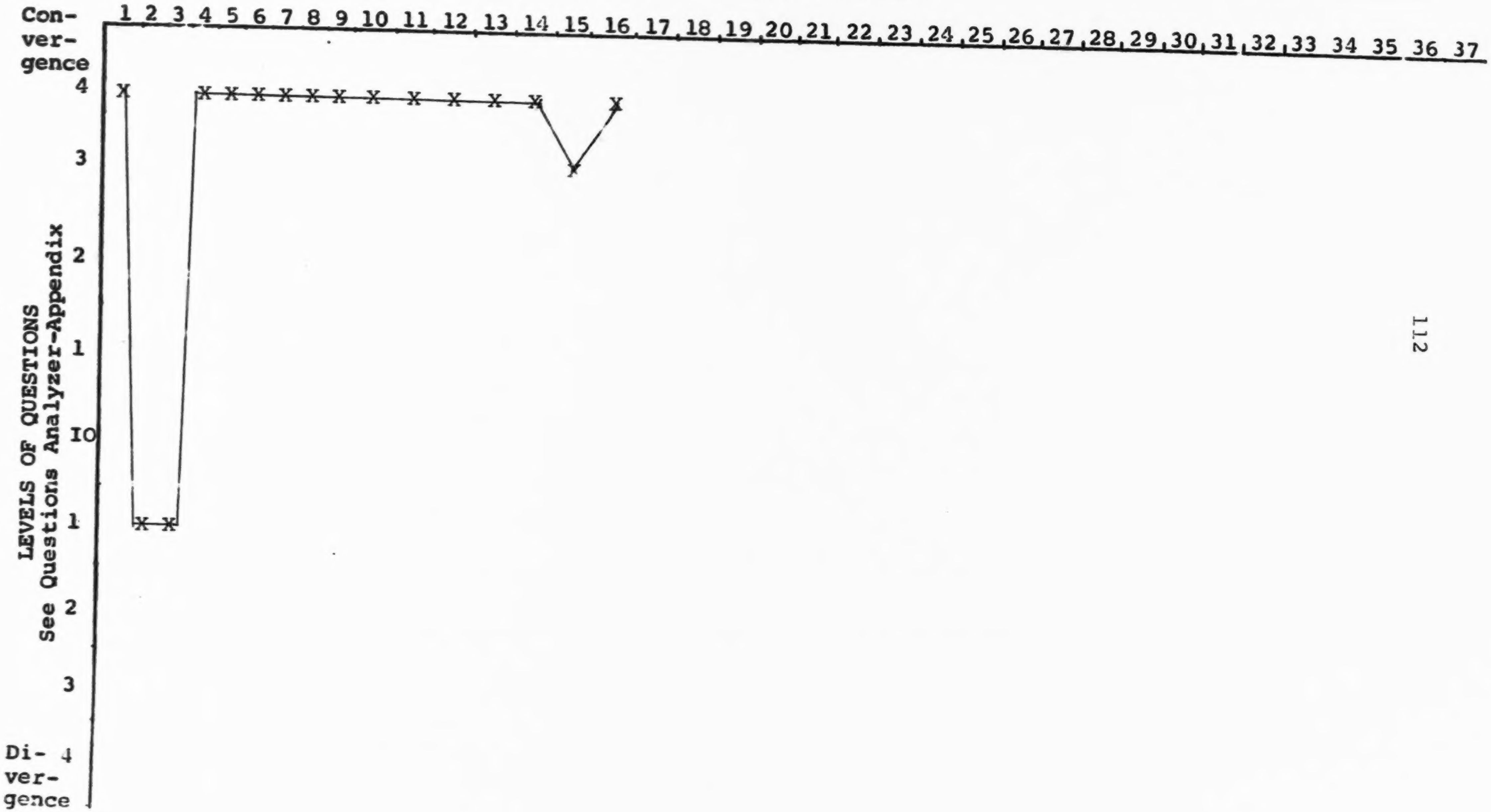
Time 11.0

Tape analysis #1 0

Tape analysis #2 X

Tape analysis #3 +

Questions by Order of Presentation



GRAPHIC PRESENTATION OF TAPE ANALYSIS

Teacher # 20

Grade 4

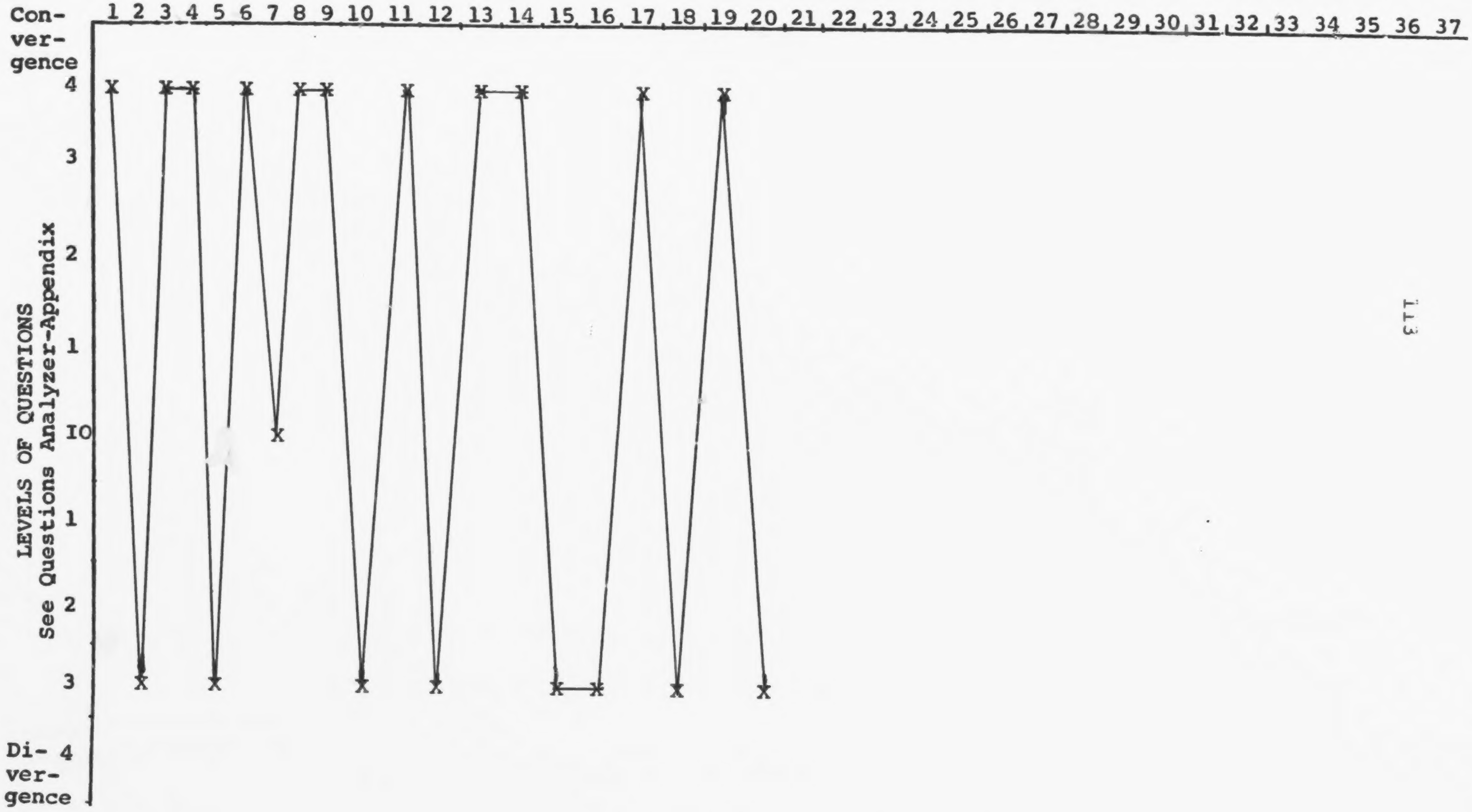
Time 15.0

Tape analysis #1 0

Tape analysis #2 X

Tape analysis #3 +

Questions by Order of Presentation



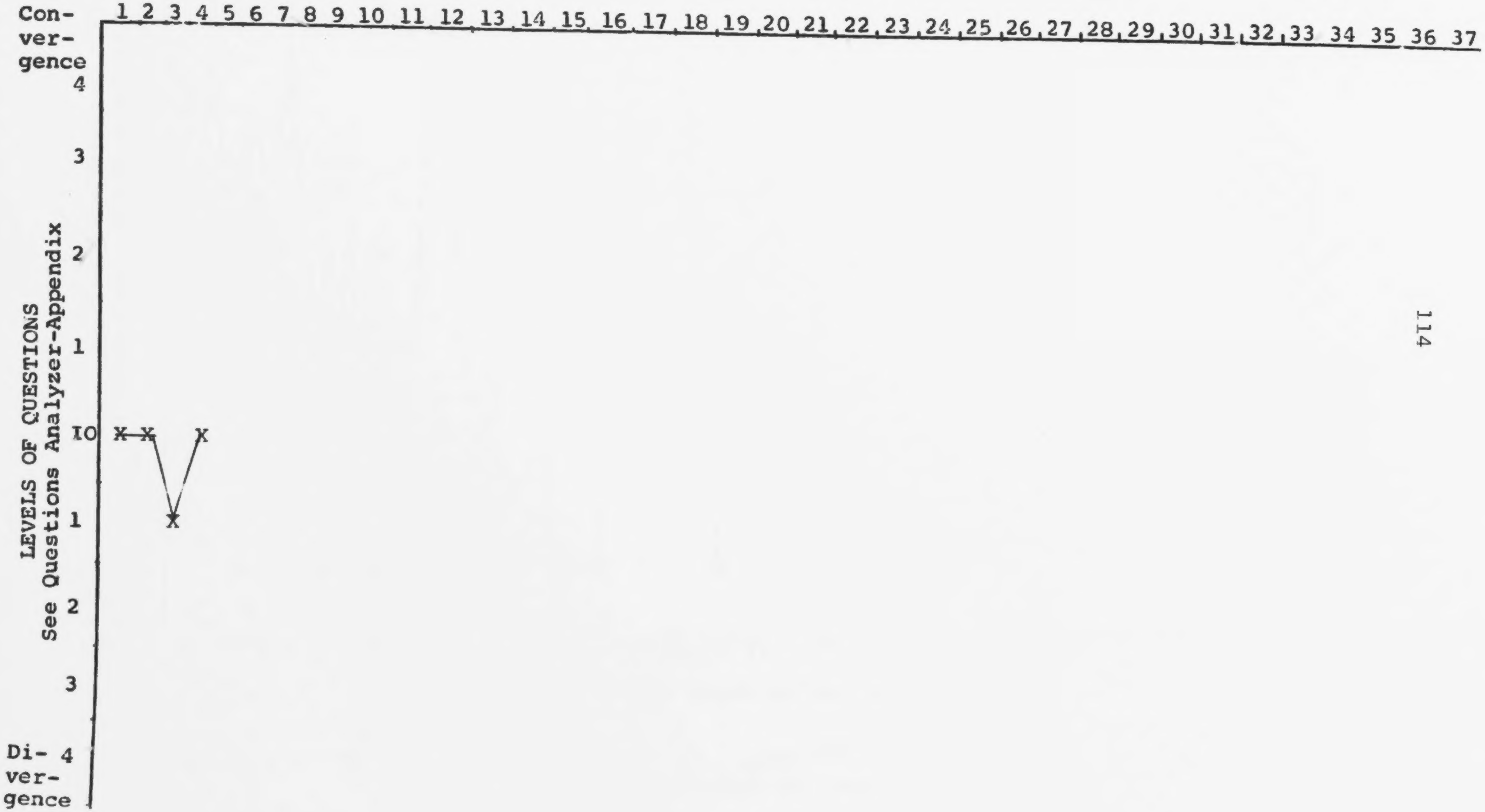
GRAPHIC PRESENTATION OF TAPE ANALYSIS

Teacher # 21
Grade 6

Time 15.0

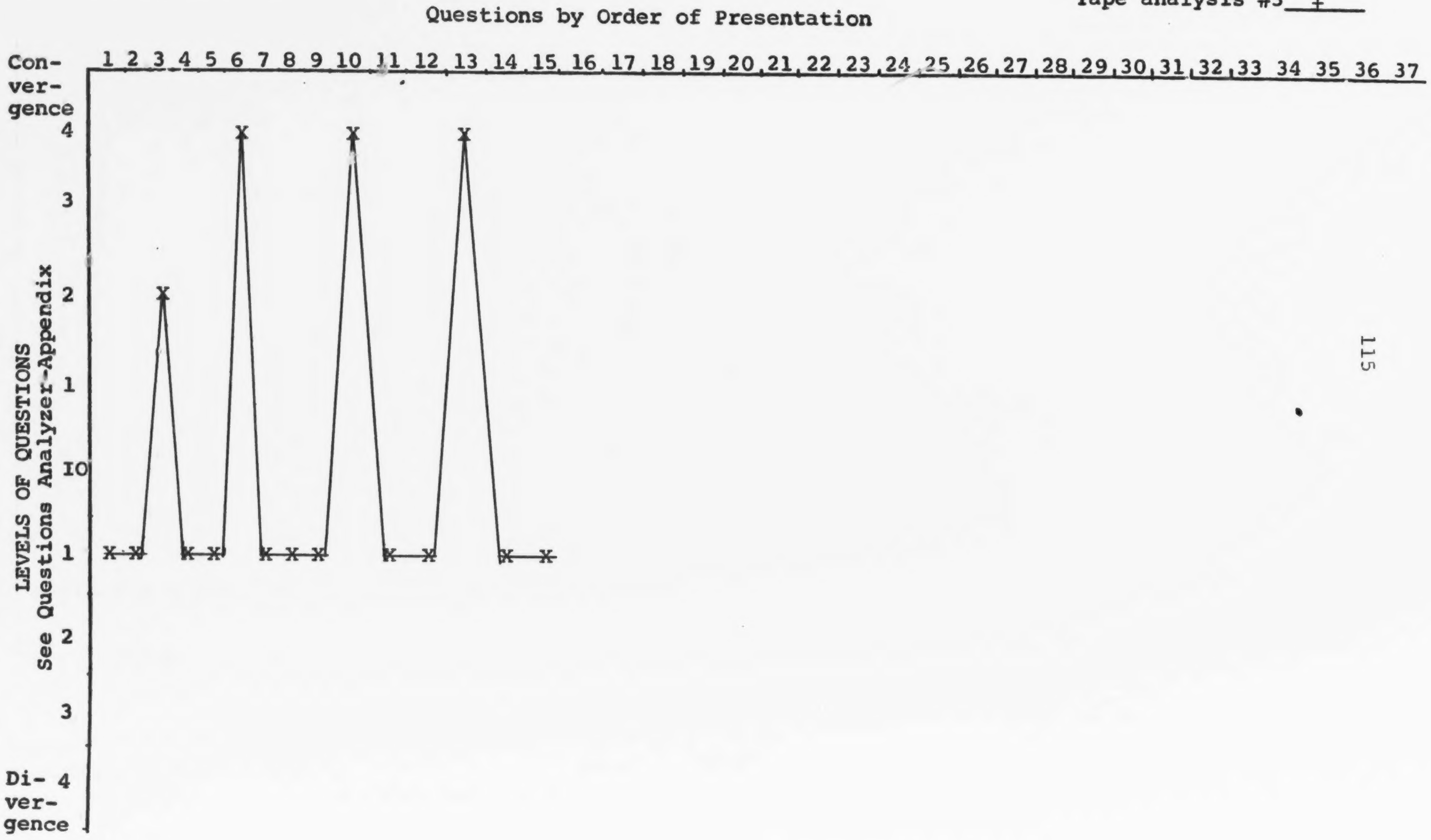
Tape analysis #1 0
Tape analysis #2 X
Tape analysis #3 +

Questions by Order of Presentation



GRAPHIC PRESENTATION OF TAPE ANALYSIS

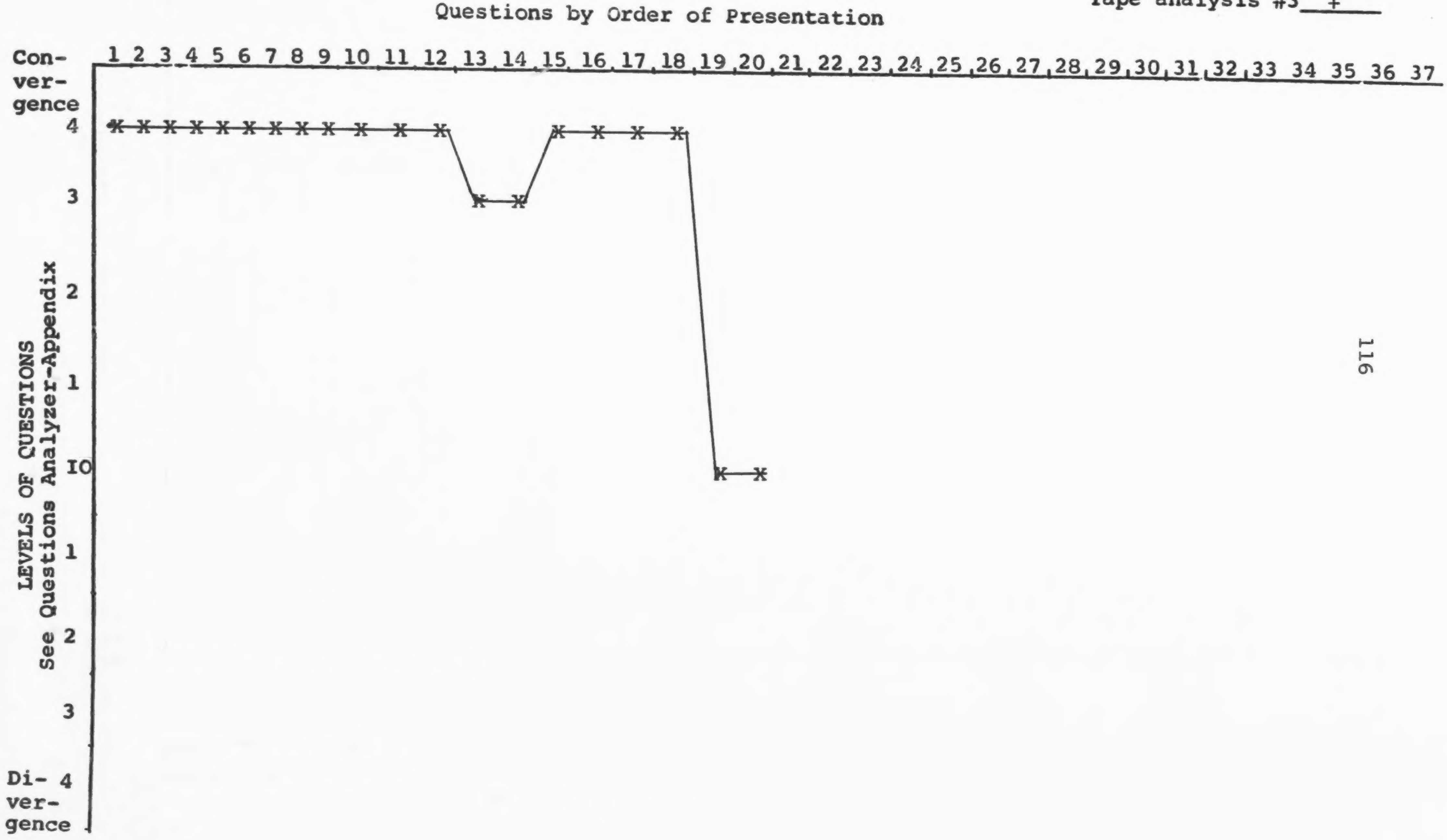
Teacher # 22
Grade 6
Time 10.0
Tape analysis #1 0
Tape analysis #2 X
Tape analysis #3 +



GRAPHIC PRESENTATION OF TAPE ANALYSIS

Teacher # 23
Grade 5
Time 10.1

Tape analysis #1 0
Tape analysis #2 X
Tape analysis #3 +

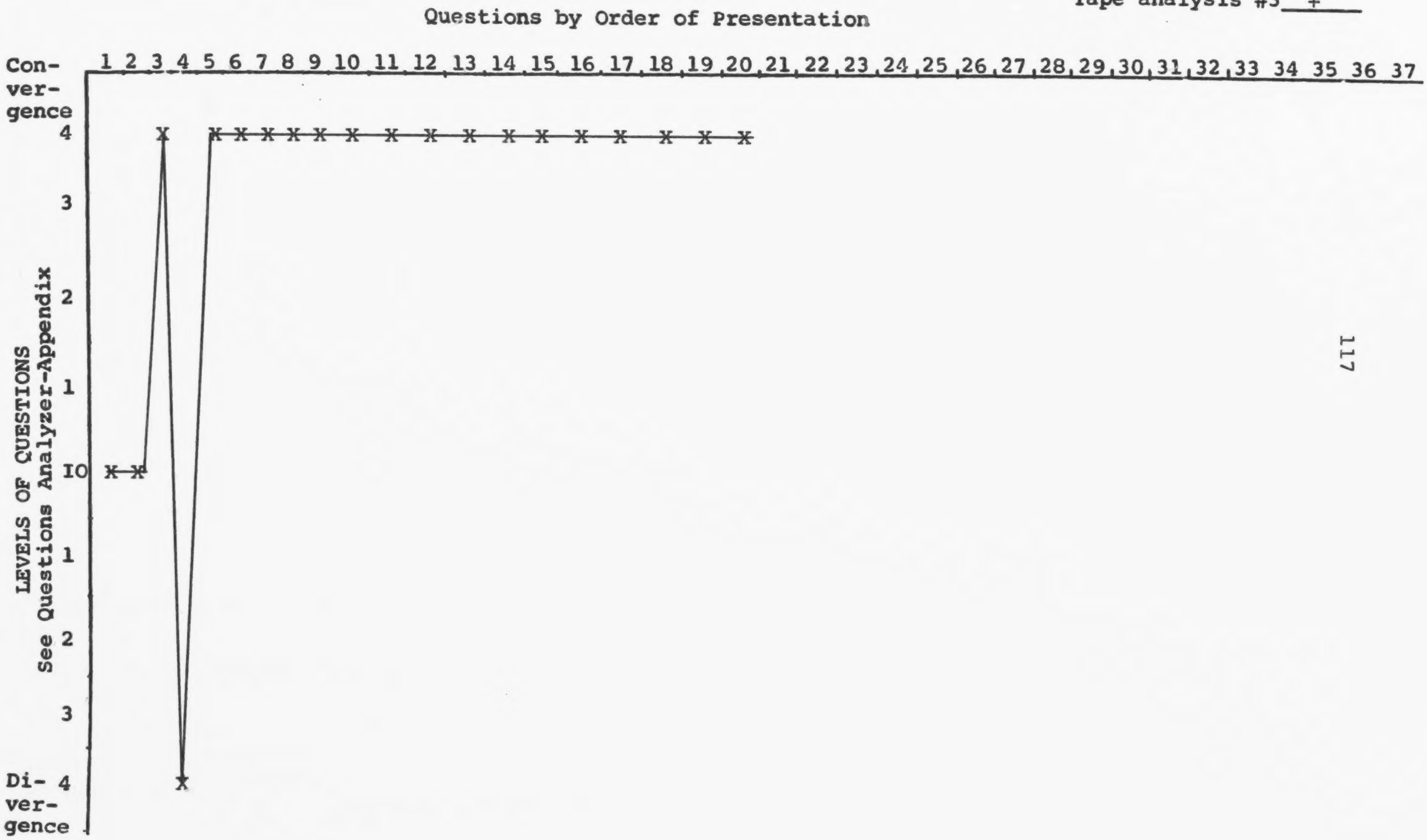


GRAPHIC PRESENTATION OF TAPE ANALYSIS

Teacher # 24
Grade 3

Time 15.0

Tape analysis #1 0
Tape analysis #2 X
Tape analysis #3 +

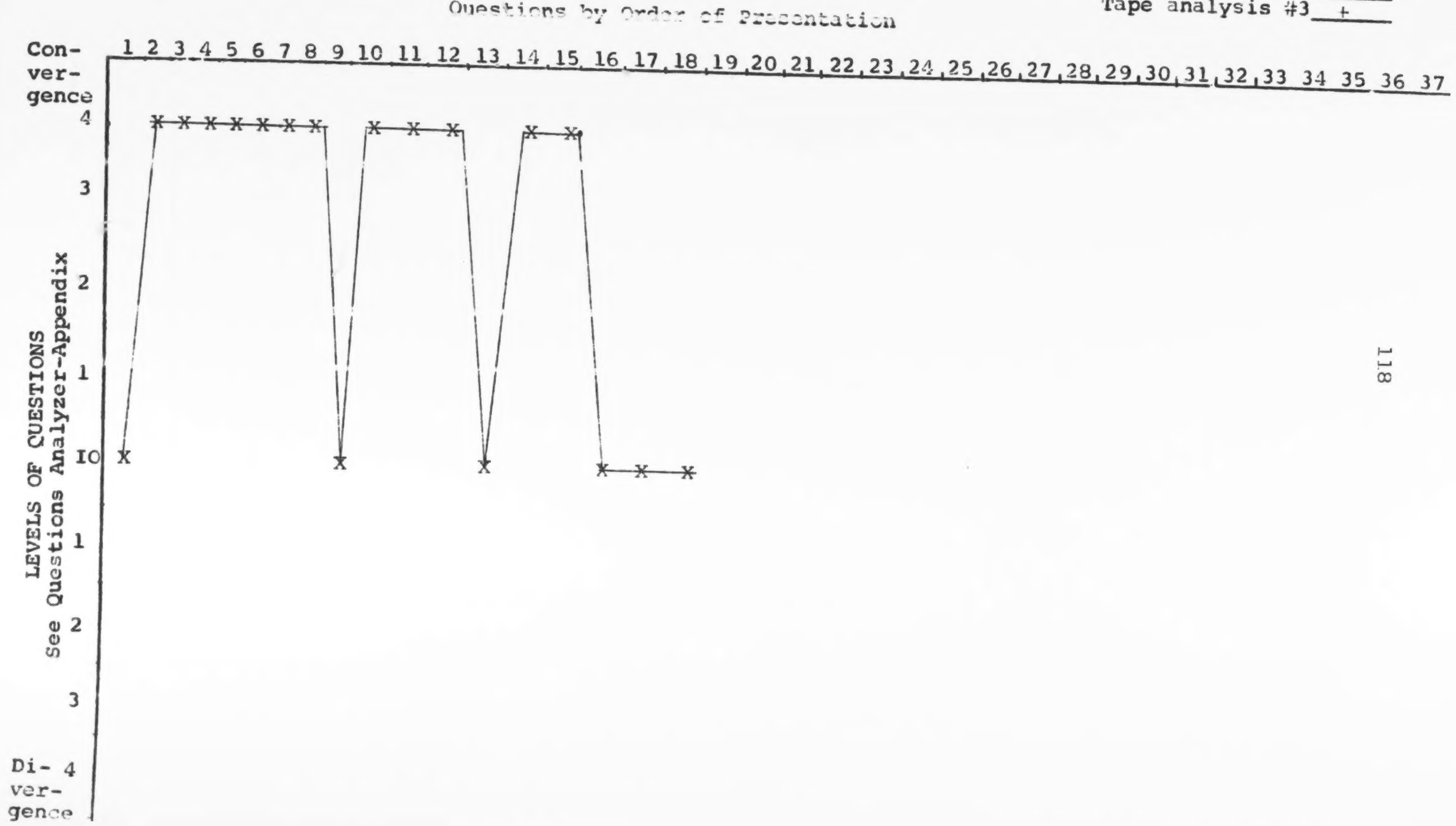


Teacher # 25
Grade 6

GRAPHIC PRESENTATION OF TAPE ANALYSIS

Time 11.0

Tape analysis #1 0
Tape analysis #2 X
Tape analysis #3 +



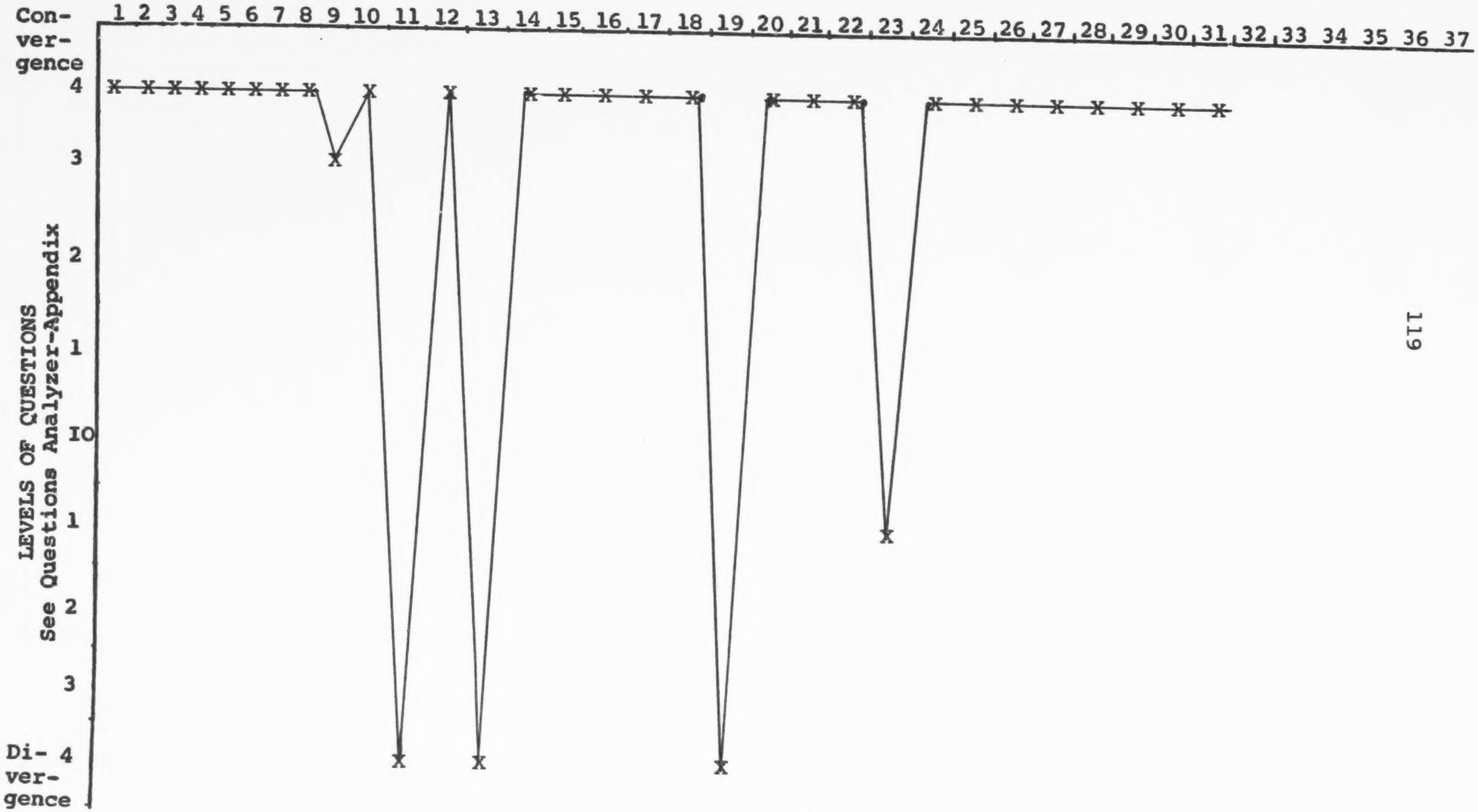
GRAPHIC PRESENTATION OF TAPE ANALYSIS

Teacher # 26
Grade 5

Time 11.1

Tape analysis #1 0
Tape analysis #2 X
Tape analysis #3 +

Questions by Order of Presentation



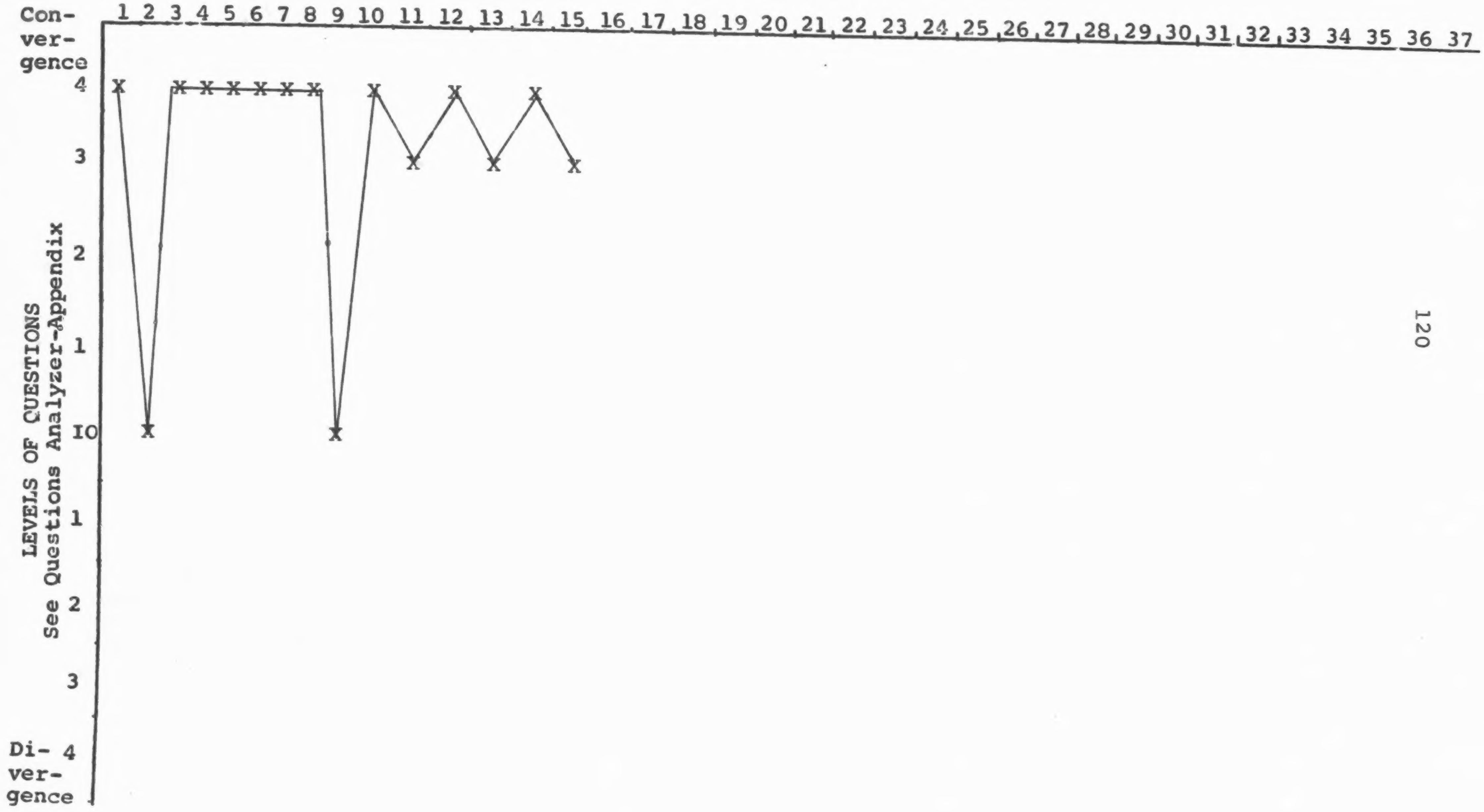
GRAPHIC PRESENTATION OF TAPE ANALYSIS

Teacher # 28
Grade 5 & 6

Time 11.0

Tape analysis #1 0
Tape analysis #2 X
Tape analysis #3 +

Questions by Order of Presentation



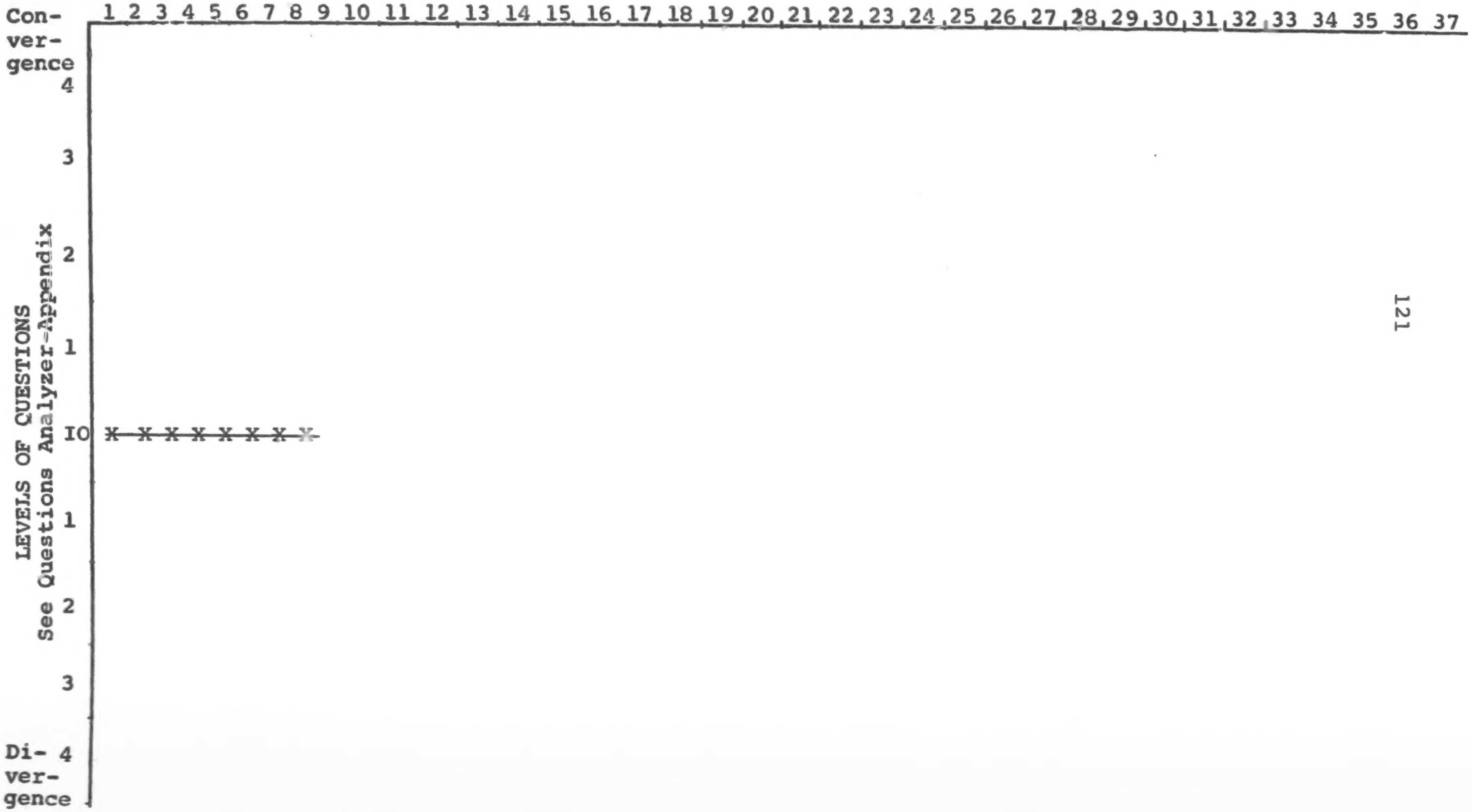
GRAPHIC PRESENTATION OF TAPE ANALYSIS

Teacher # 29
Grade 1

Time 8.0

Tape analysis #1 0
Tape analysis #2 X
Tape analysis #3 +

Questions by Order of Presentation

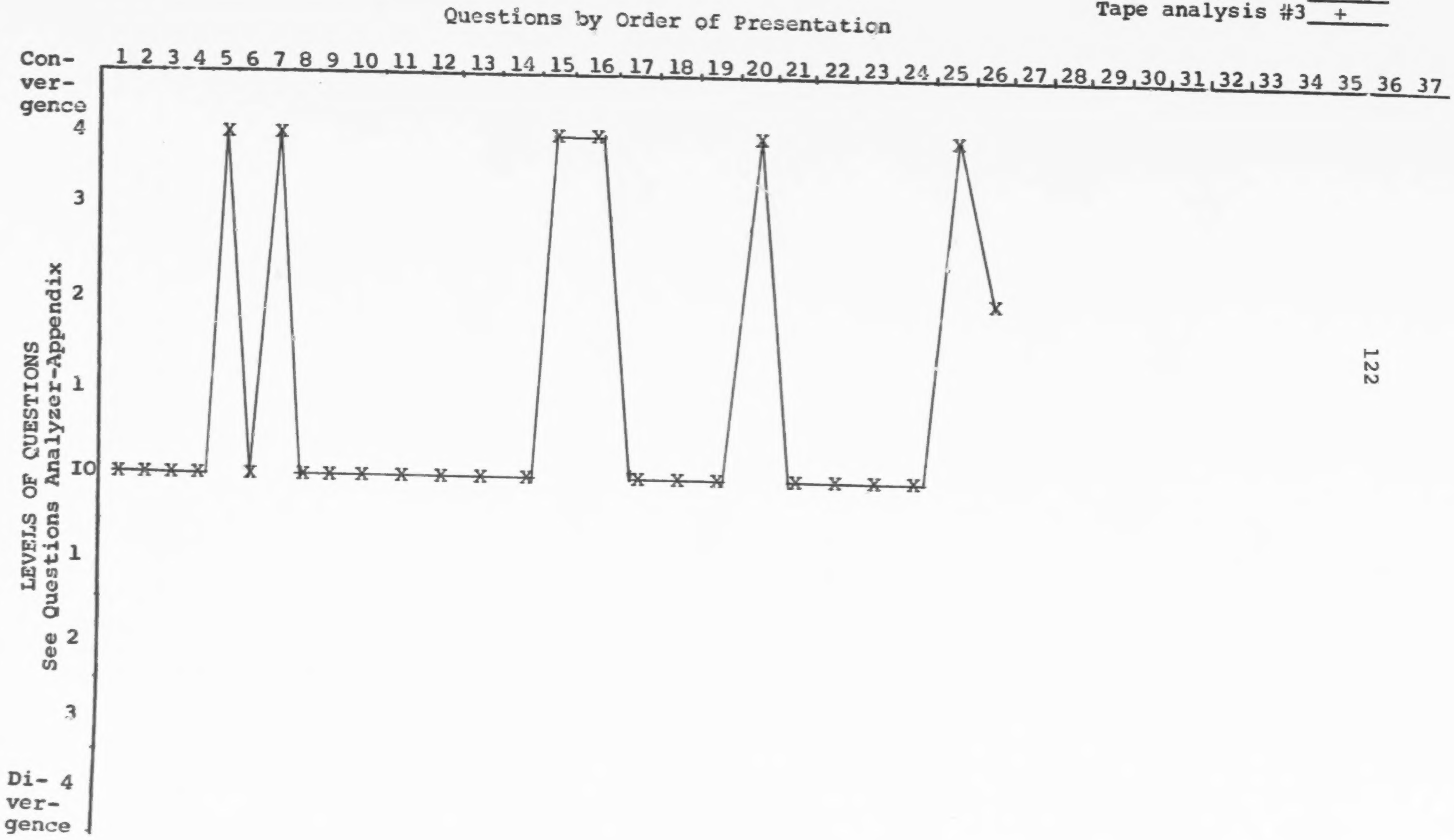


GRAPHIC PRESENTATION OF TAPE ANALYSIS

Teacher # 30
Grade 4

Time 15.0

Tape analysis #1 0
Tape analysis #2 X
Tape analysis #3 +



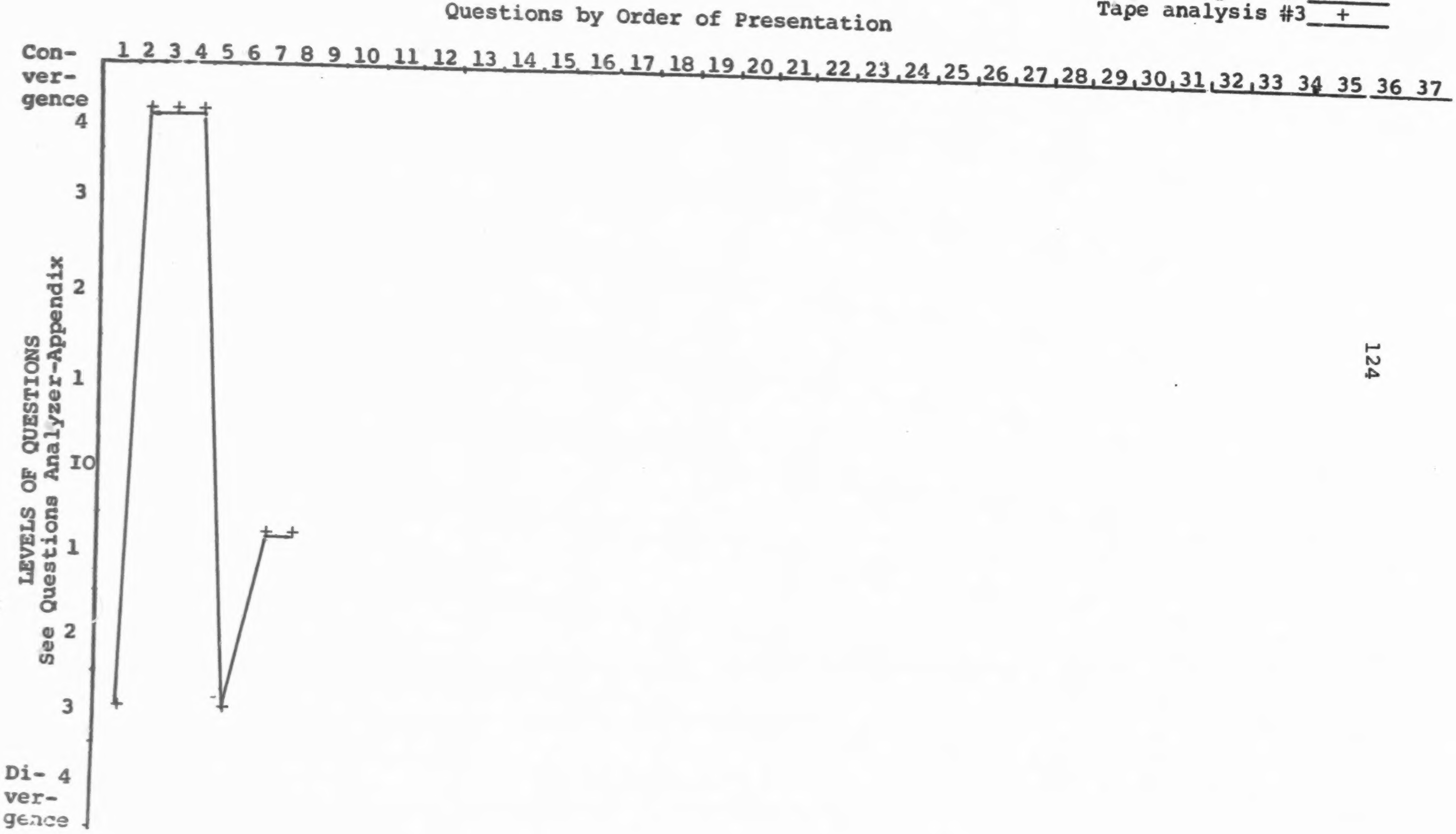
TAPE 3

GRAPHIC PRESENTATION OF TAPE ANALYSIS

Teacher # 1
Grade 5 & 6

Time 12.5

Tape analysis #1 0
Tape analysis #2 X
Tape analysis #3 +



GRAPHIC PRESENTATION OF TAPE ANALYSIS

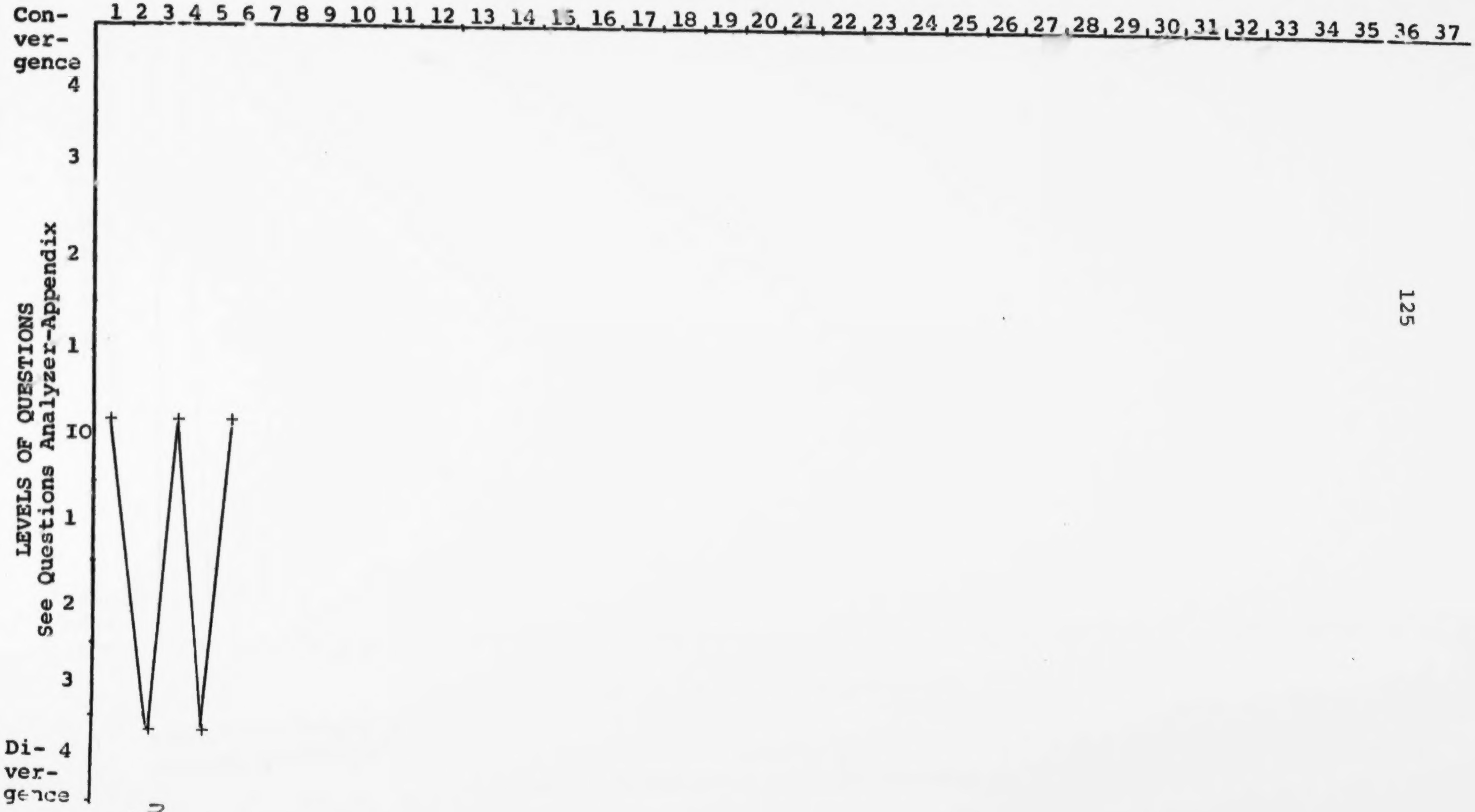
Teacher # 3

Grade 5

Time 5.2

Tape analysis #1 0
Tape analysis #2 X
Tape analysis #3 +

Questions by Order of Presentation

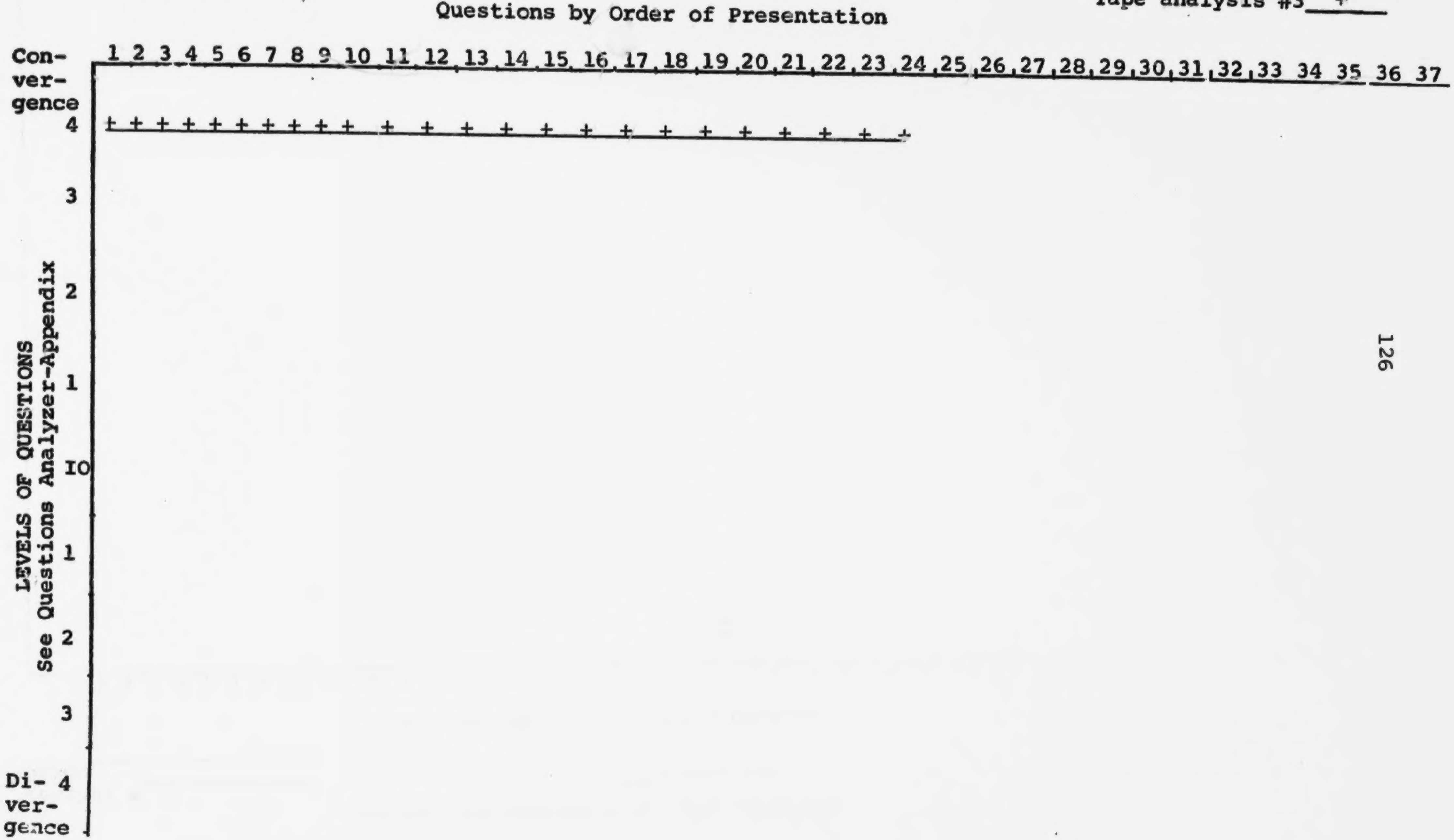


3

GRAPHIC PRESENTATION OF TAPE ANALYSIS

Teacher # 4
Grade 6
Time 10.0

Tape analysis #1 0
Tape analysis #2 X
Tape analysis #3 +



GRAPHIC PRESENTATION OF TAPE ANALYSIS

Teacher # 5

Grade 5

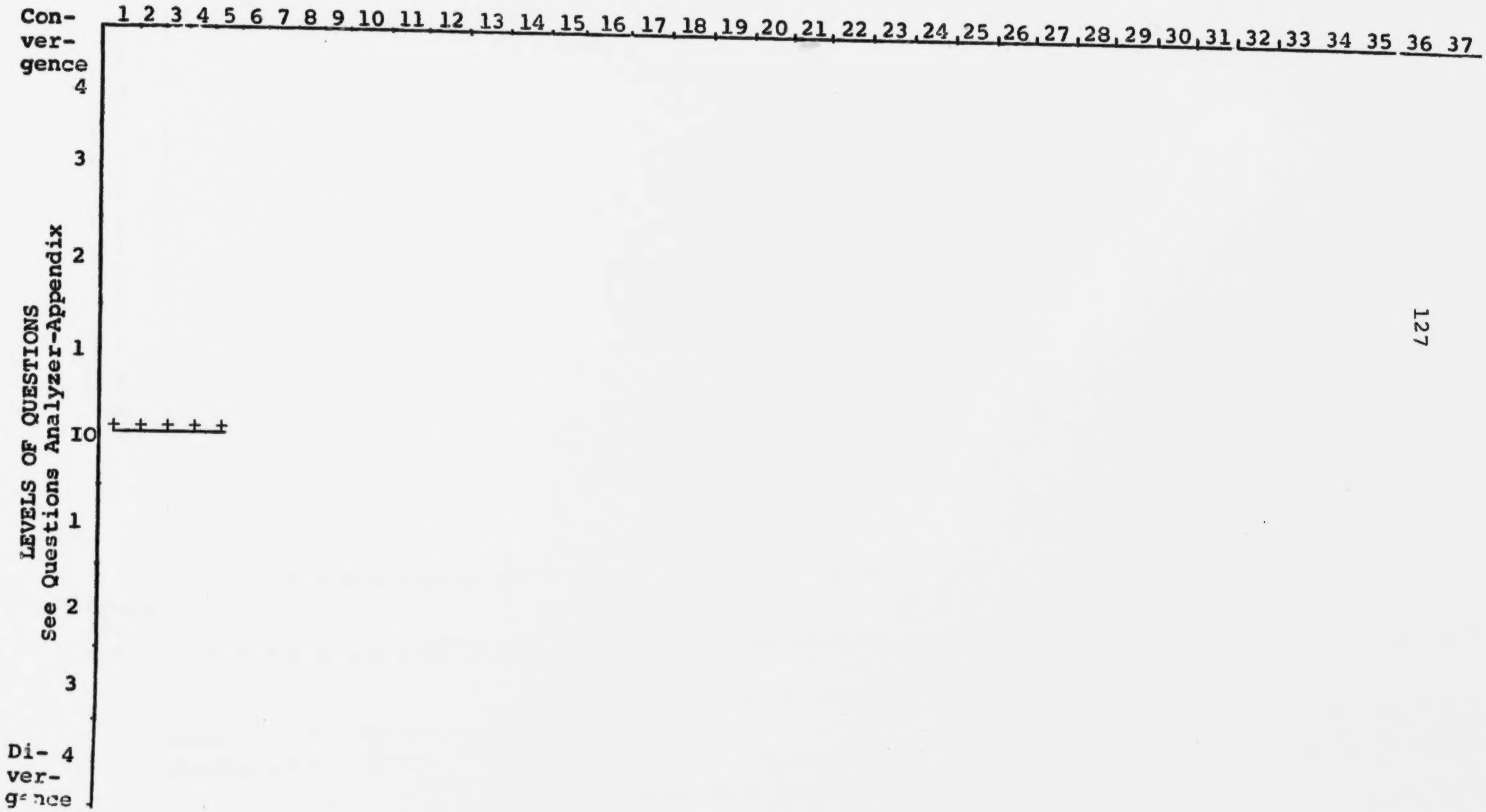
Time 11.0

Tape analysis #1 0

Tape analysis #2 X

Tape analysis #3 +

Questions by Order of Presentation

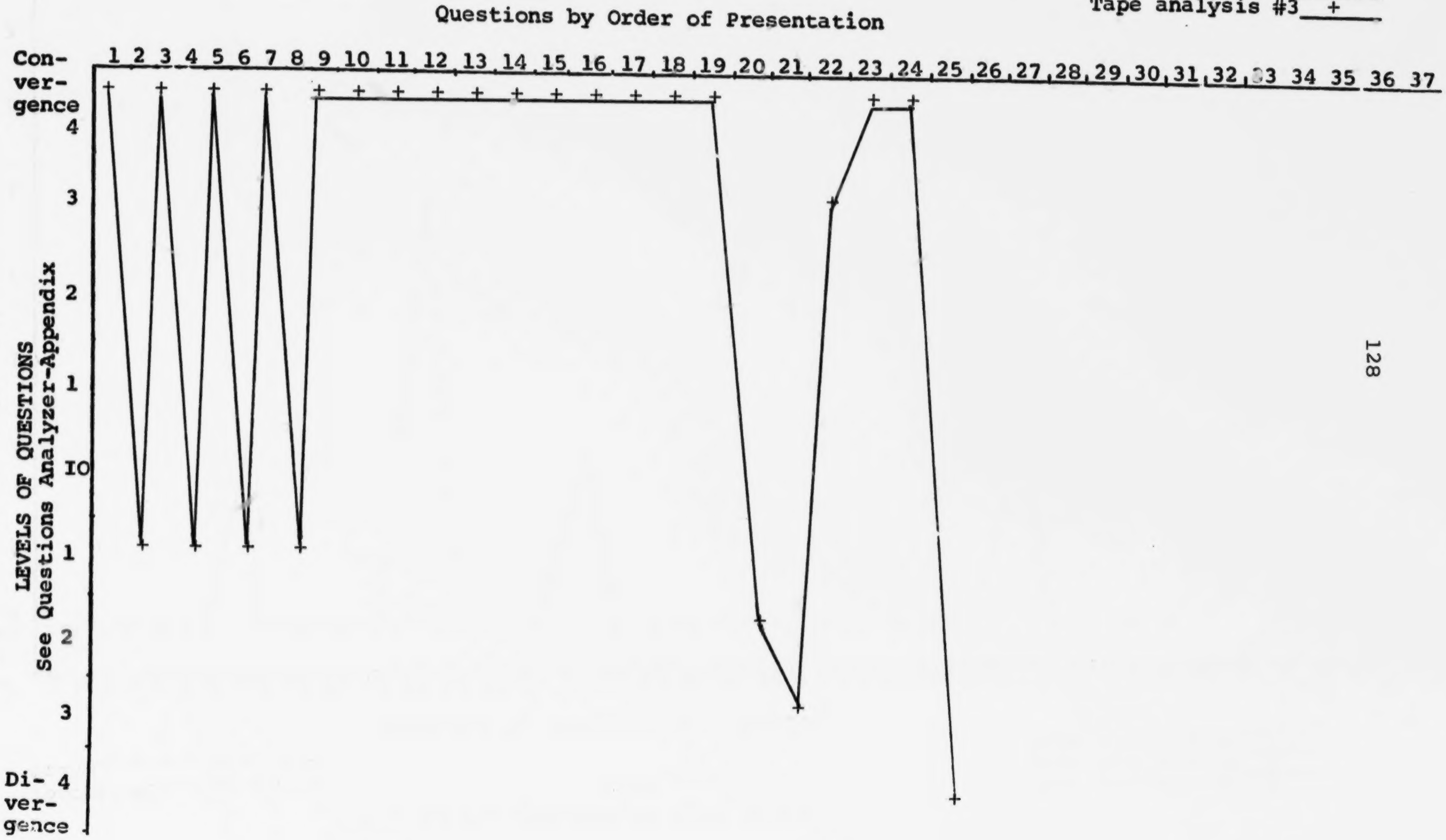


GRAPHIC PRESENTATION OF TAPE ANALYSIS

Teacher # 6
Grade 4

Time 15.0

Tape analysis #1 0
Tape analysis #2 X
Tape analysis #3 +



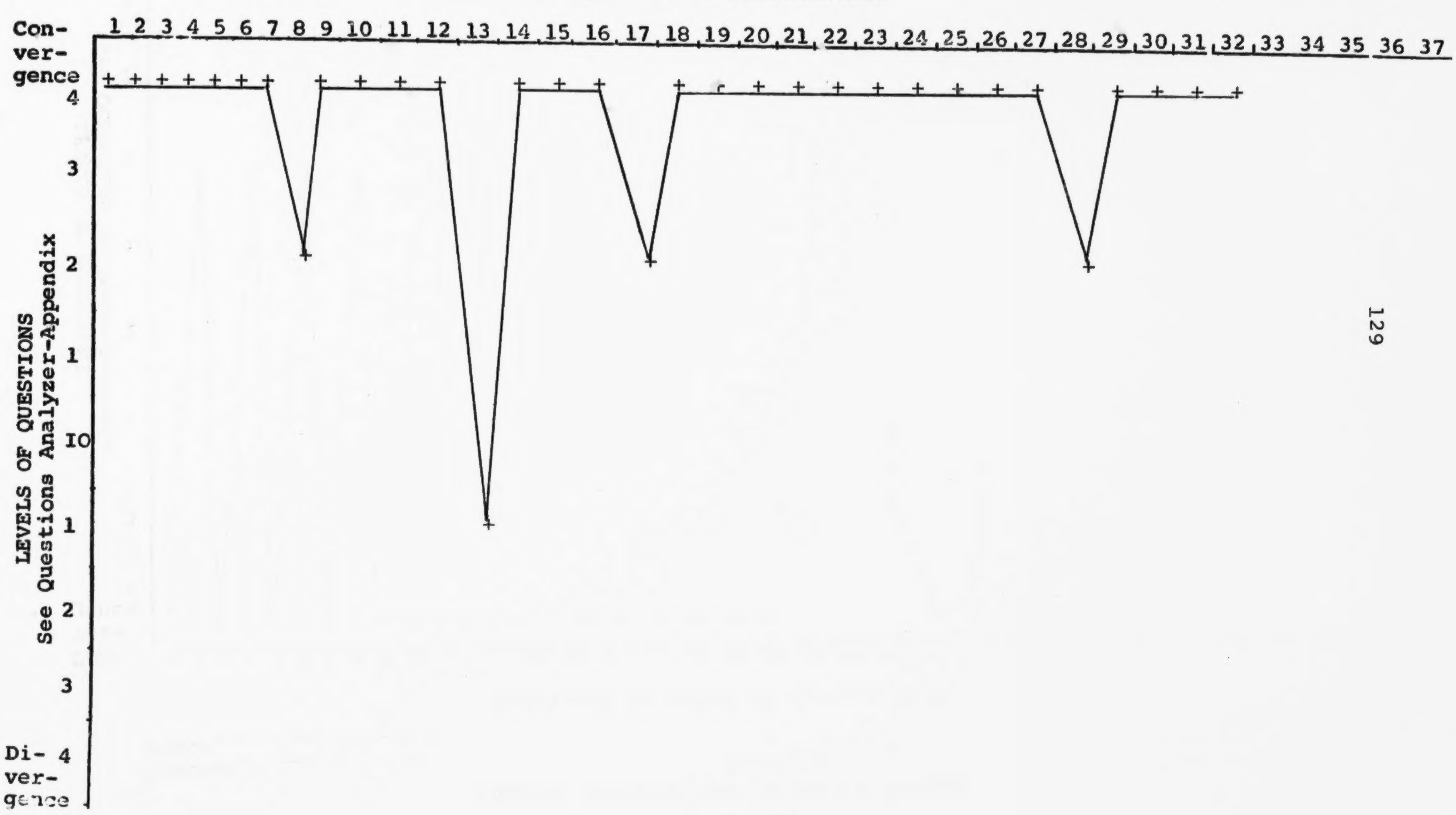
GRAPHIC PRESENTATION OF TAPE ANALYSIS

Teacher # 7
Grade 6

Time 15.0

Tape analysis #1 0
Tape analysis #2 X
Tape analysis #3 +

Questions by Order of Presentation



GRAPHIC PRESENTATION OF TAPE ANALYSIS

Teacher # 8

Grade 5

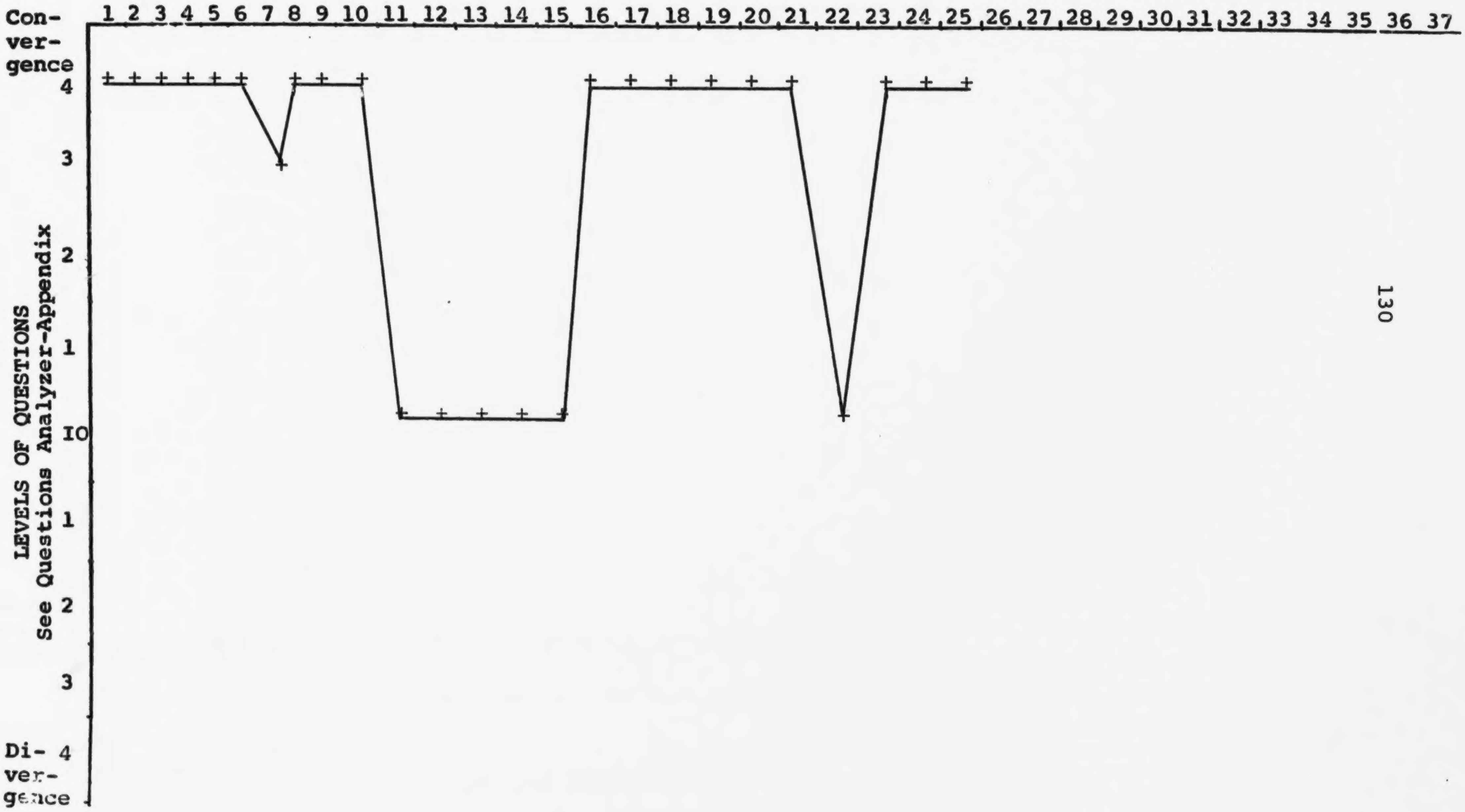
Time 15.0

Tape analysis #1 0

Tape analysis #2 X

Tape analysis #3 +

Questions by Order of Presentation



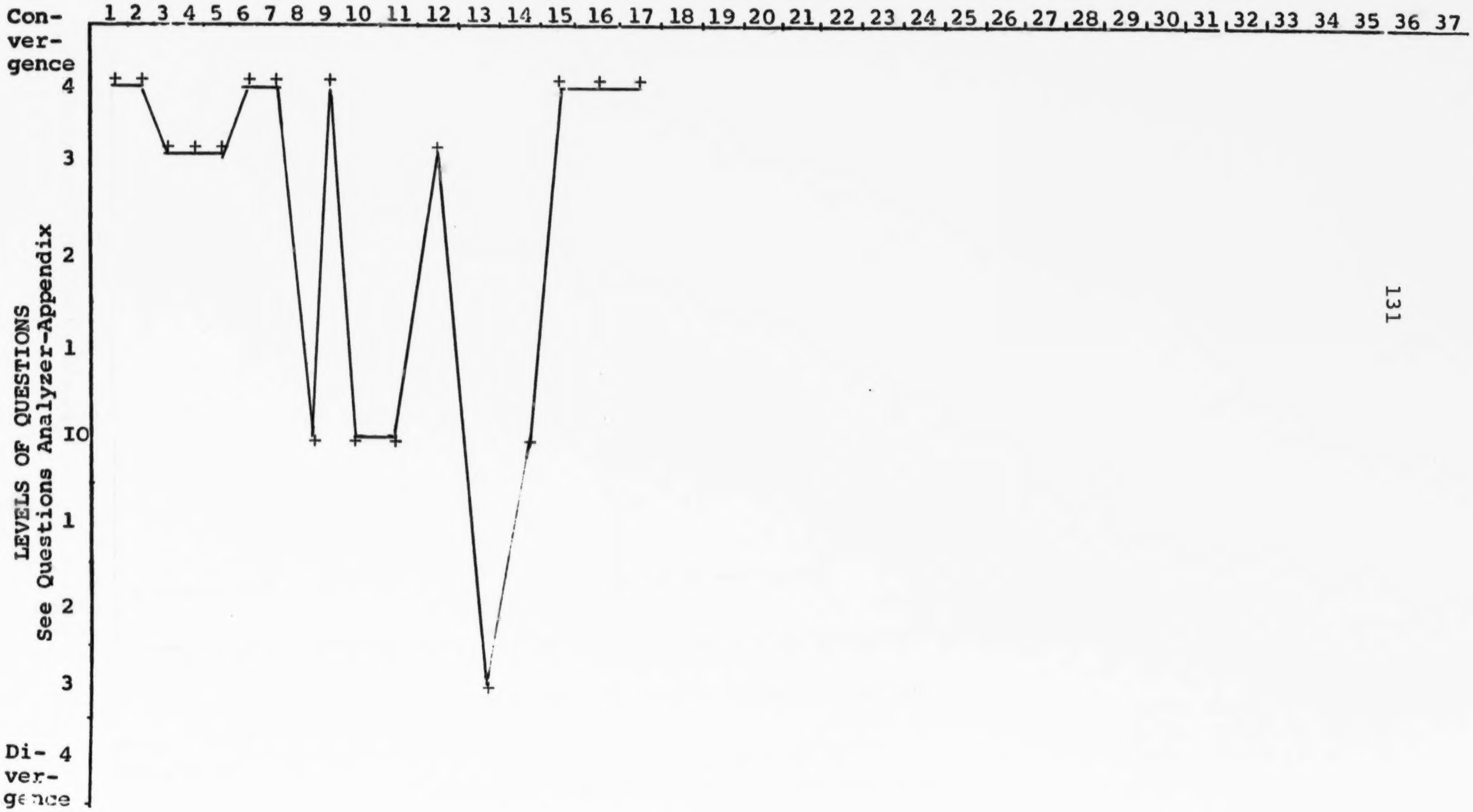
GRAPHIC PRESENTATION OF TAPE ANALYSIS

Teacher # 9
Grade 3

Time 15.0

Tape analysis #1 0
Tape analysis #2 X
Tape analysis #3 +

Questions by Order of Presentation



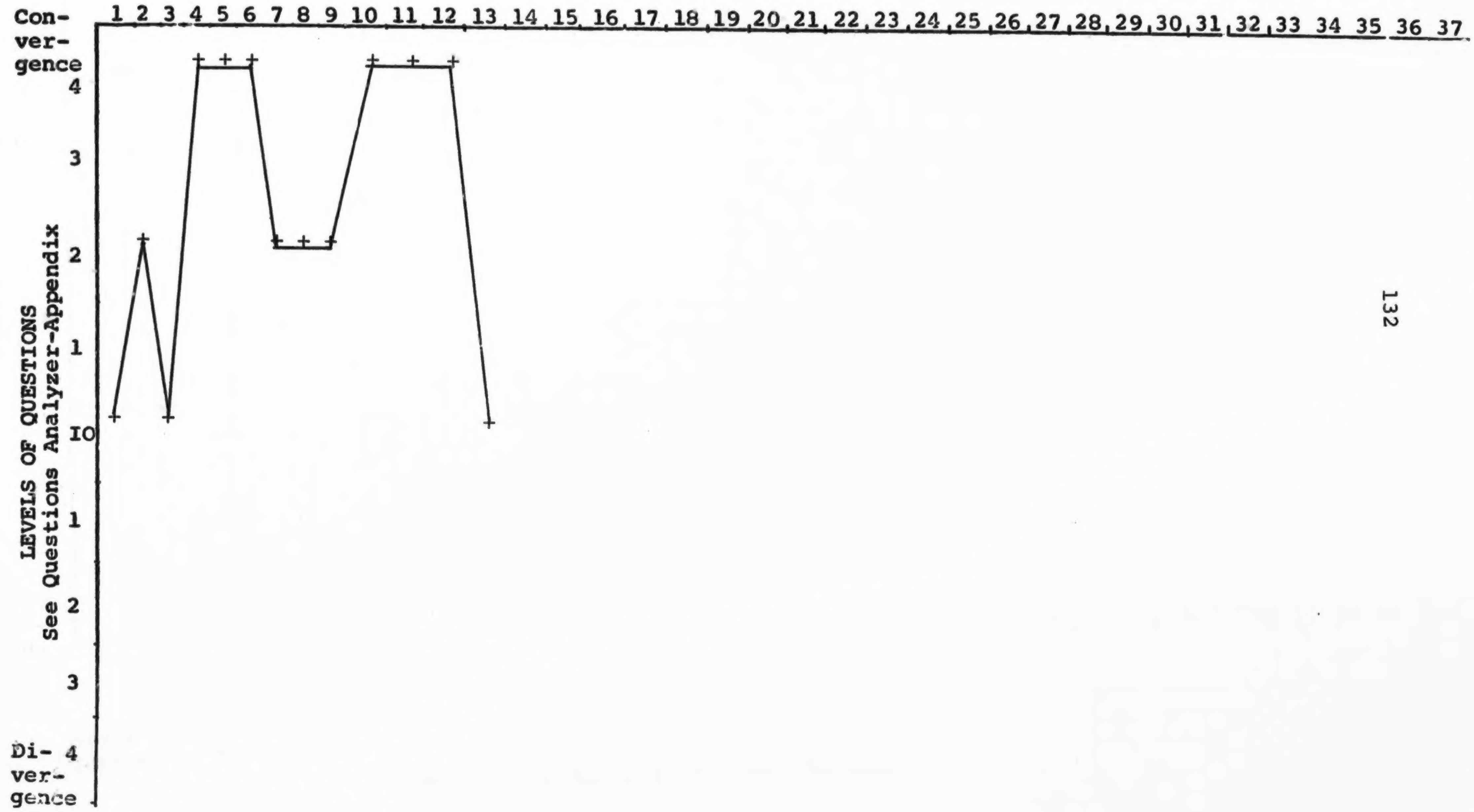
GRAPHIC PRESENTATION OF TAPE ANALYSIS

Teacher # 10
Grade 4

Time 10.0

Tape analysis #1 0
Tape analysis #2 X
Tape analysis #3 +

Questions by Order of Presentation



GRAPHIC PRESENTATION OF TAPE ANALYSIS

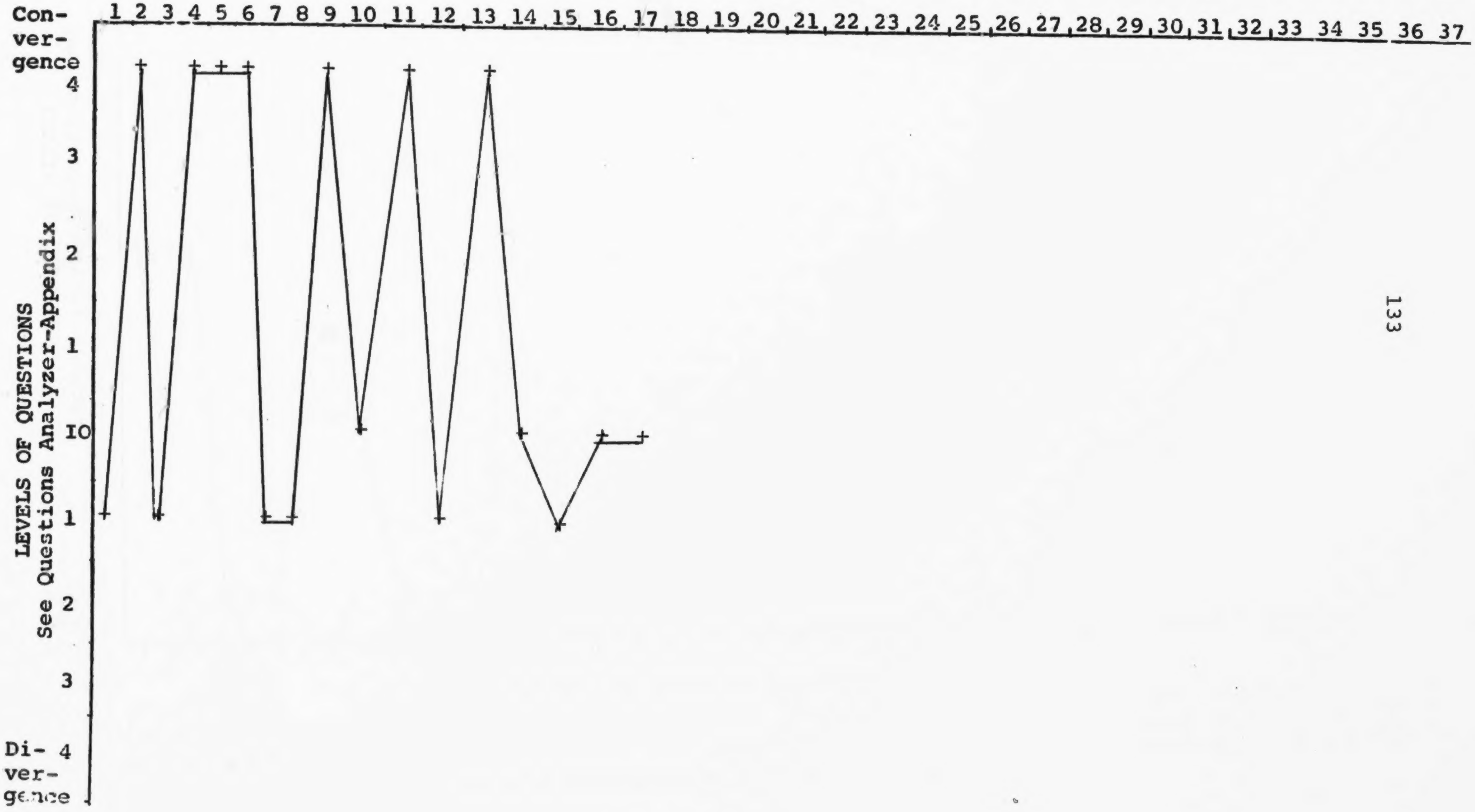
Teacher # 11

Grade 4

Time 10.0

Tape analysis #1 0
Tape analysis #2 X
Tape analysis #3 +

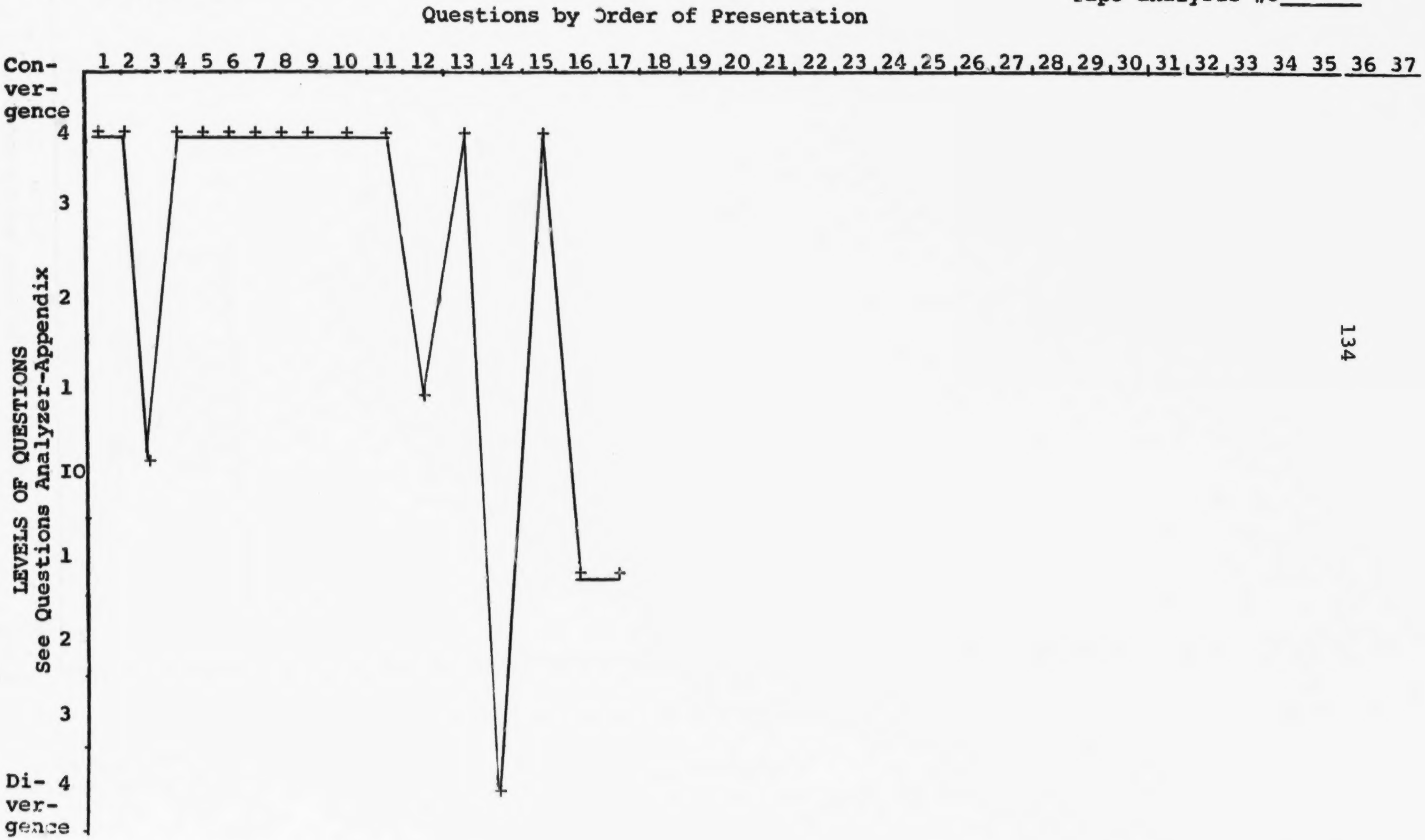
Questions by Order of Presentation



GRAPHIC PRESENTATION OF TAPE ANALYSIS

Teacher # 12
Grade 3
Time 10.0

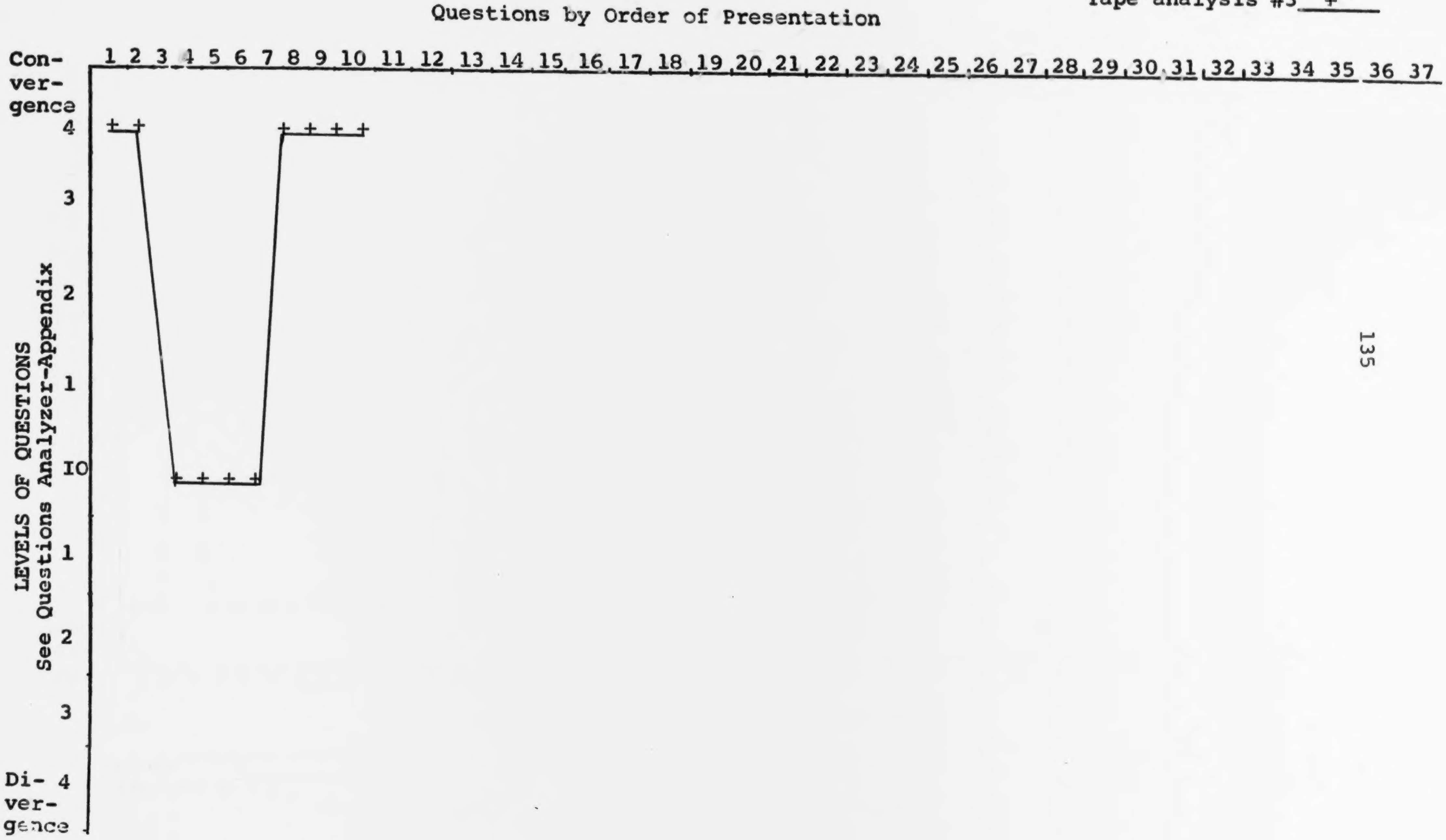
Tape analysis #1 0
Tape analysis #2 X
Tape analysis #3 +



GRAPHIC PRESENTATION OF TAPE ANALYSIS

Teacher # 15
Grade 2
Time 10.0

Tape analysis #1 0
Tape analysis #2 X
Tape analysis #3 +



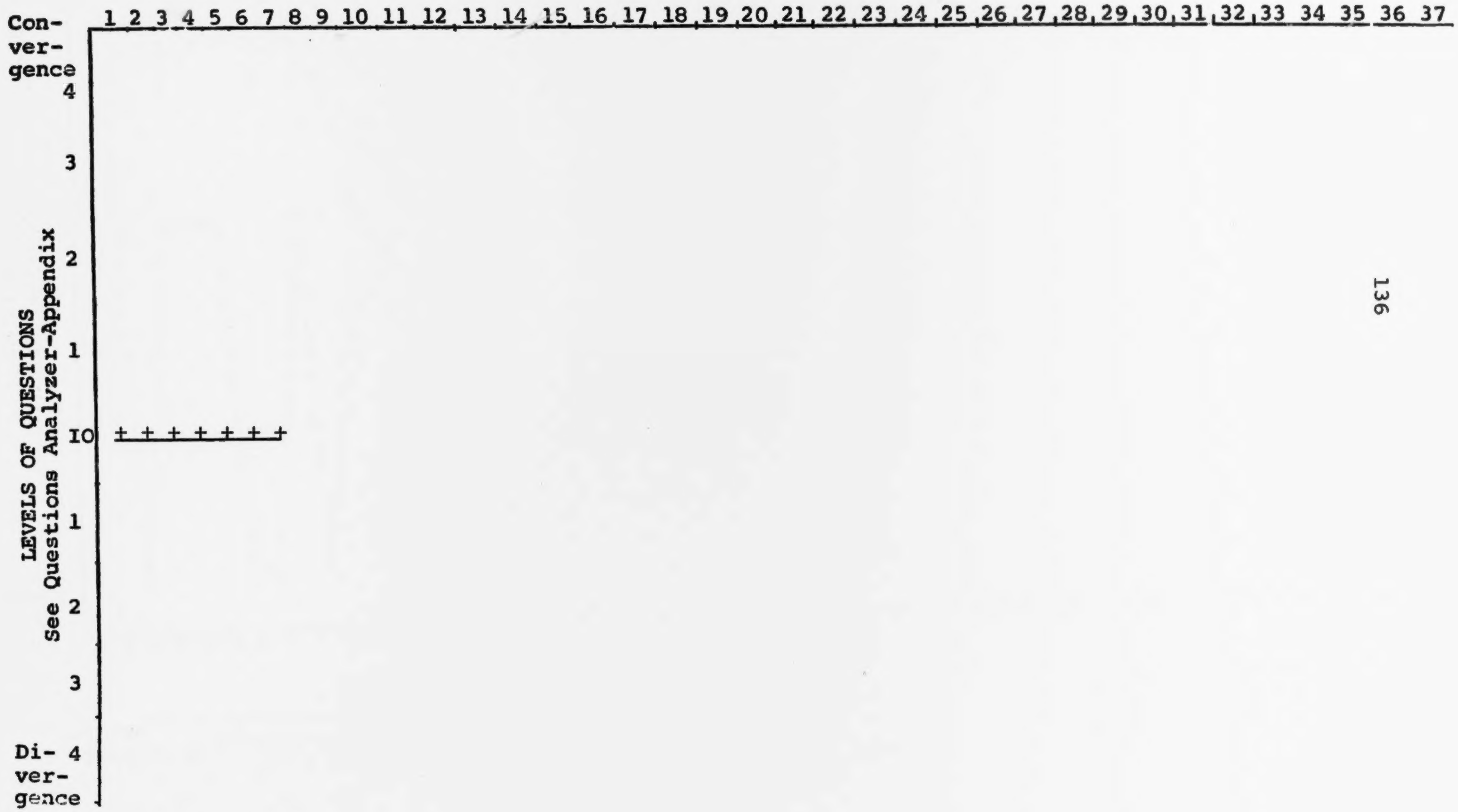
GRAPHIC PRESENTATION OF TAPE ANALYSIS

Teacher #17
Grade 6

Time 12.5

Tape analysis #1 0
Tape analysis #2 X
Tape analysis #3 +

Questions by Order of Presentation



Teacher # 18

Grade 3

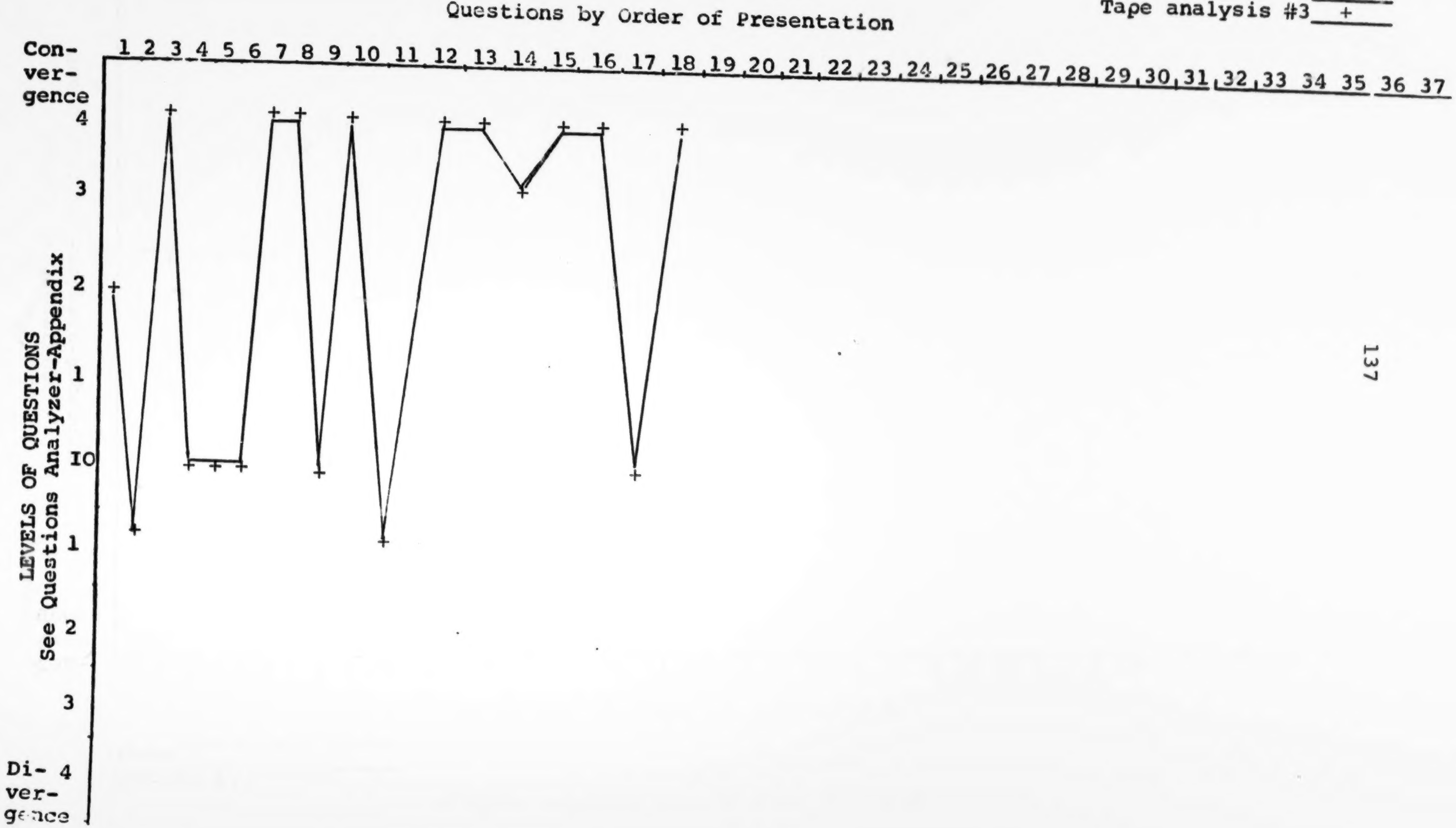
GRAPHIC PRESENTATION OF TAPE ANALYSIS

Time 10.7

Tape analysis #1 0

Tape analysis #2 X

Tape analysis #3 +



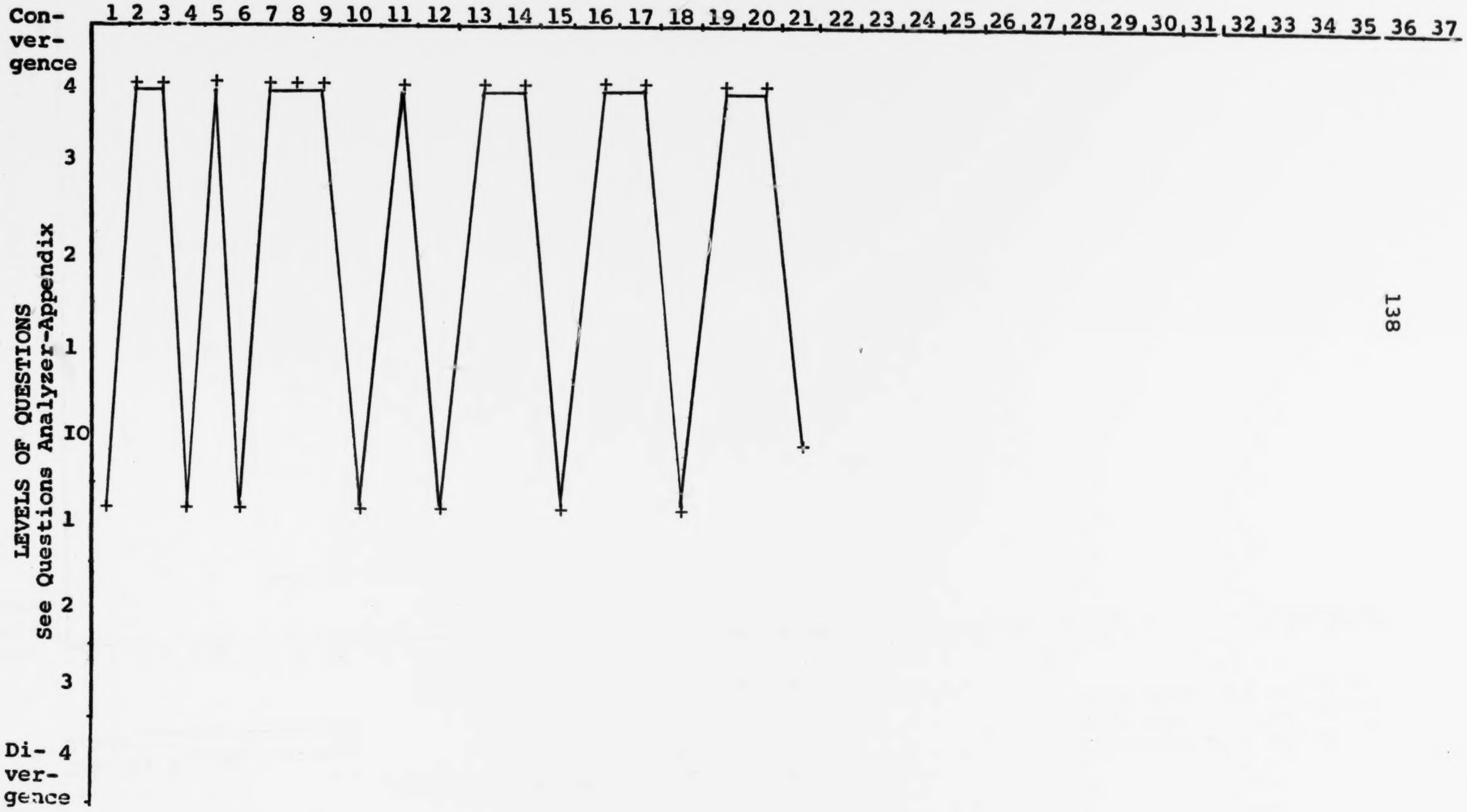
GRAPHIC PRESENTATION OF TAPE ANALYSIS

Teacher # 19
Grade 1

Time 10.0

Tape analysis #1 0
Tape analysis #2 X
Tape analysis #3 +

Questions by Order of Presentation



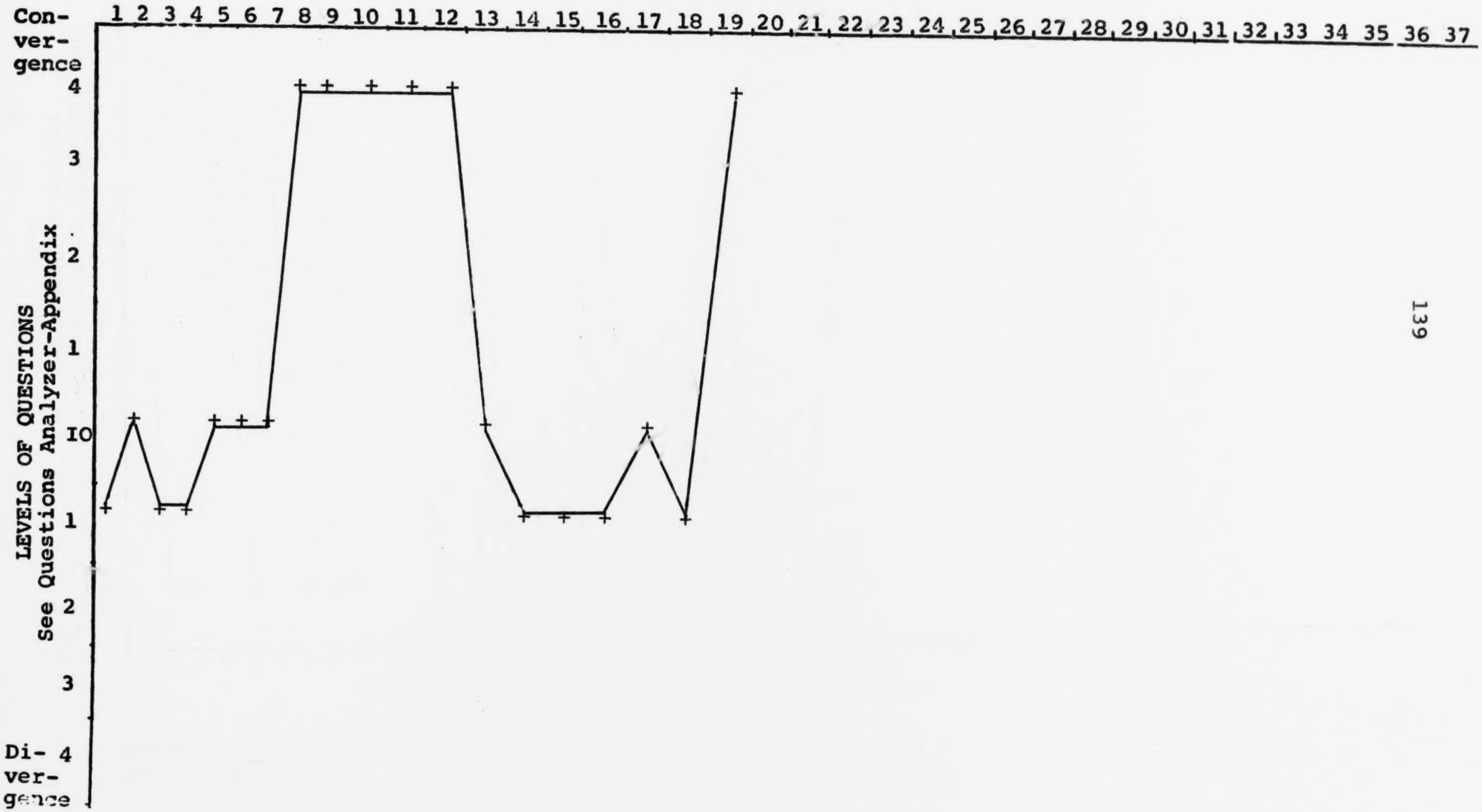
GRAPHIC PRESENTATION OF TAPE ANALYSIS

Teacher # 20
Grade 4

Time 10.5

Tape analysis #1 0
Tape analysis #2 X
Tape analysis #3 +

Questions by Order of Presentation



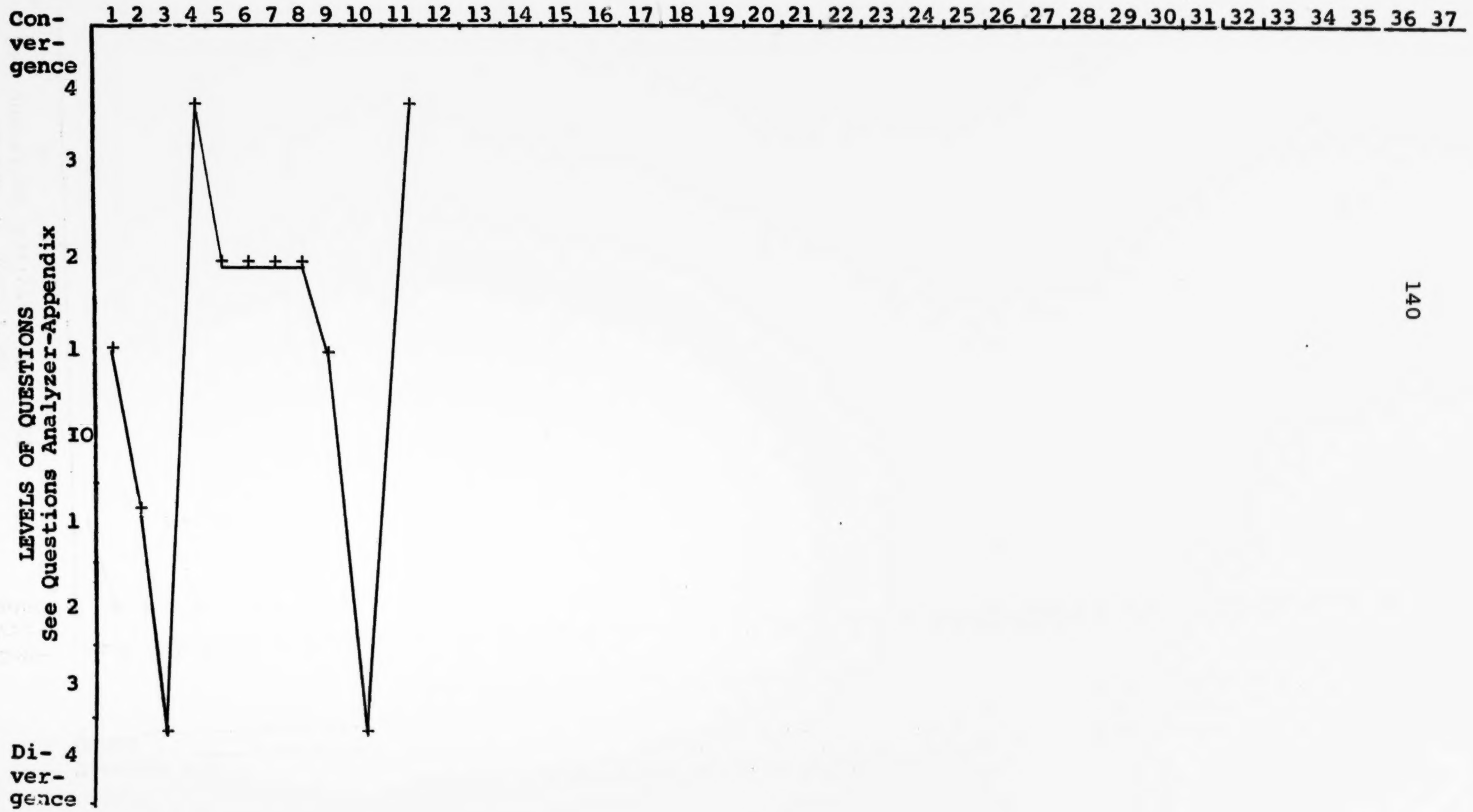
GRAPHIC PRESENTATION OF TAPE ANALYSIS

Teacher # 22
Grade 6

Time 11.0

Tape analysis #1 0
Tape analysis #2 X
Tape analysis #3 +

Questions by Order of Presentation



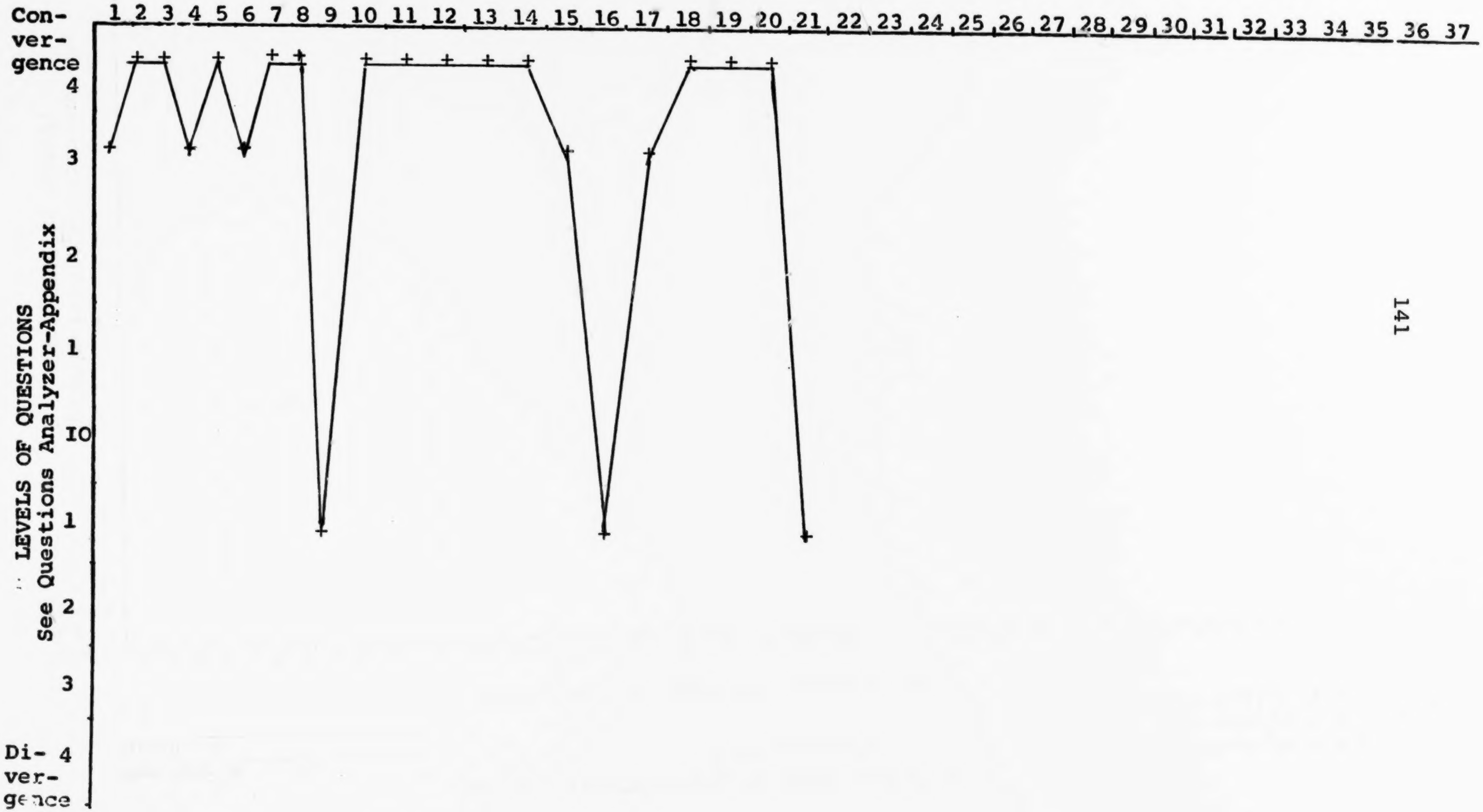
GRAPHIC PRESENTATION OF TAPE ANALYSIS

Teacher #23
Grade 5

Time 15.0

Tape analysis #1 0
Tape analysis #2 X
Tape analysis #3 +

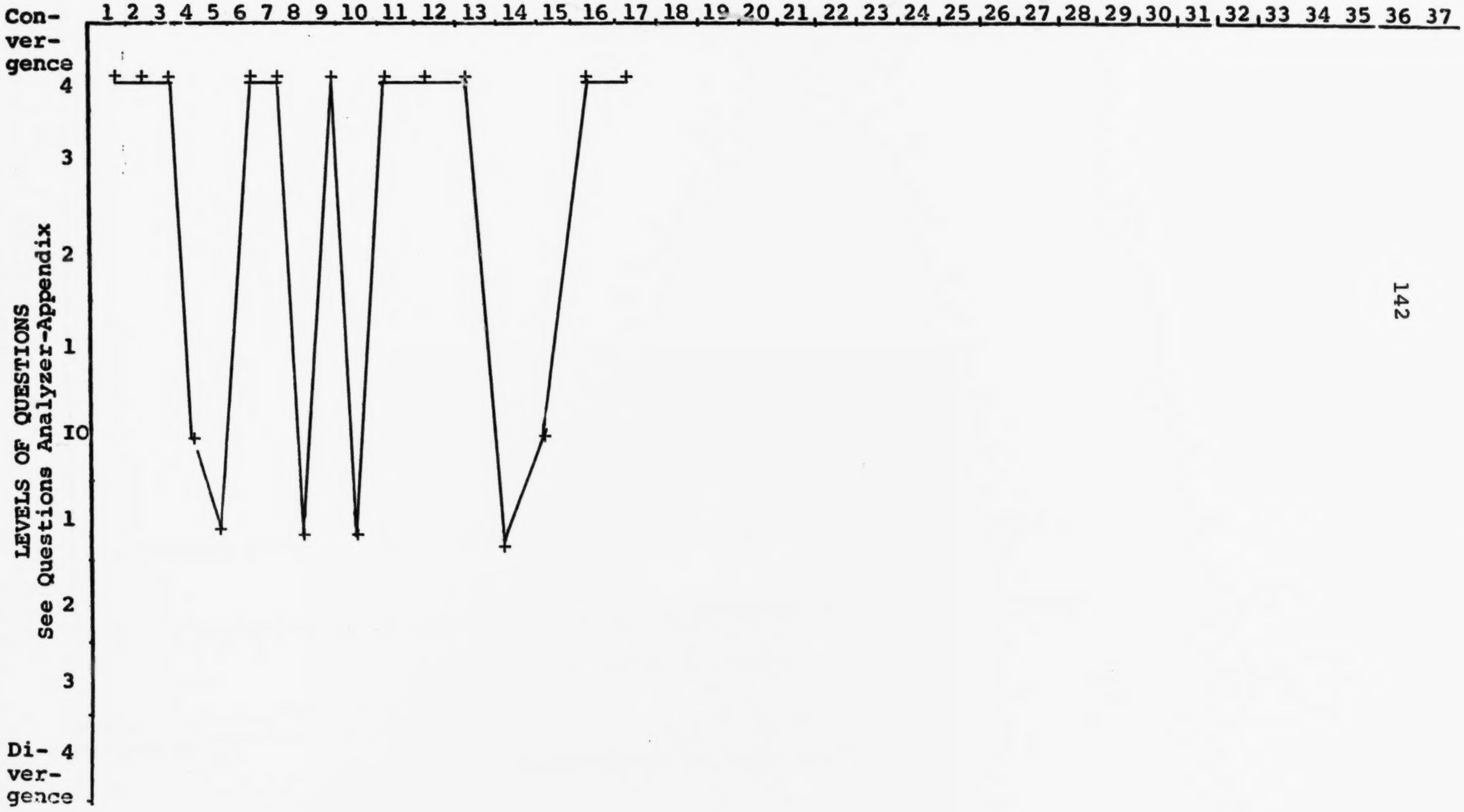
Questions by Order of Presentation



GRAPHIC PRESENTATION OF TAPE ANALYSIS

Teacher # 24
Grade 3
Time 13.0
Tape analysis #1 0
Tape analysis #2 X
Tape analysis #3 +

Questions by Order of Presentation



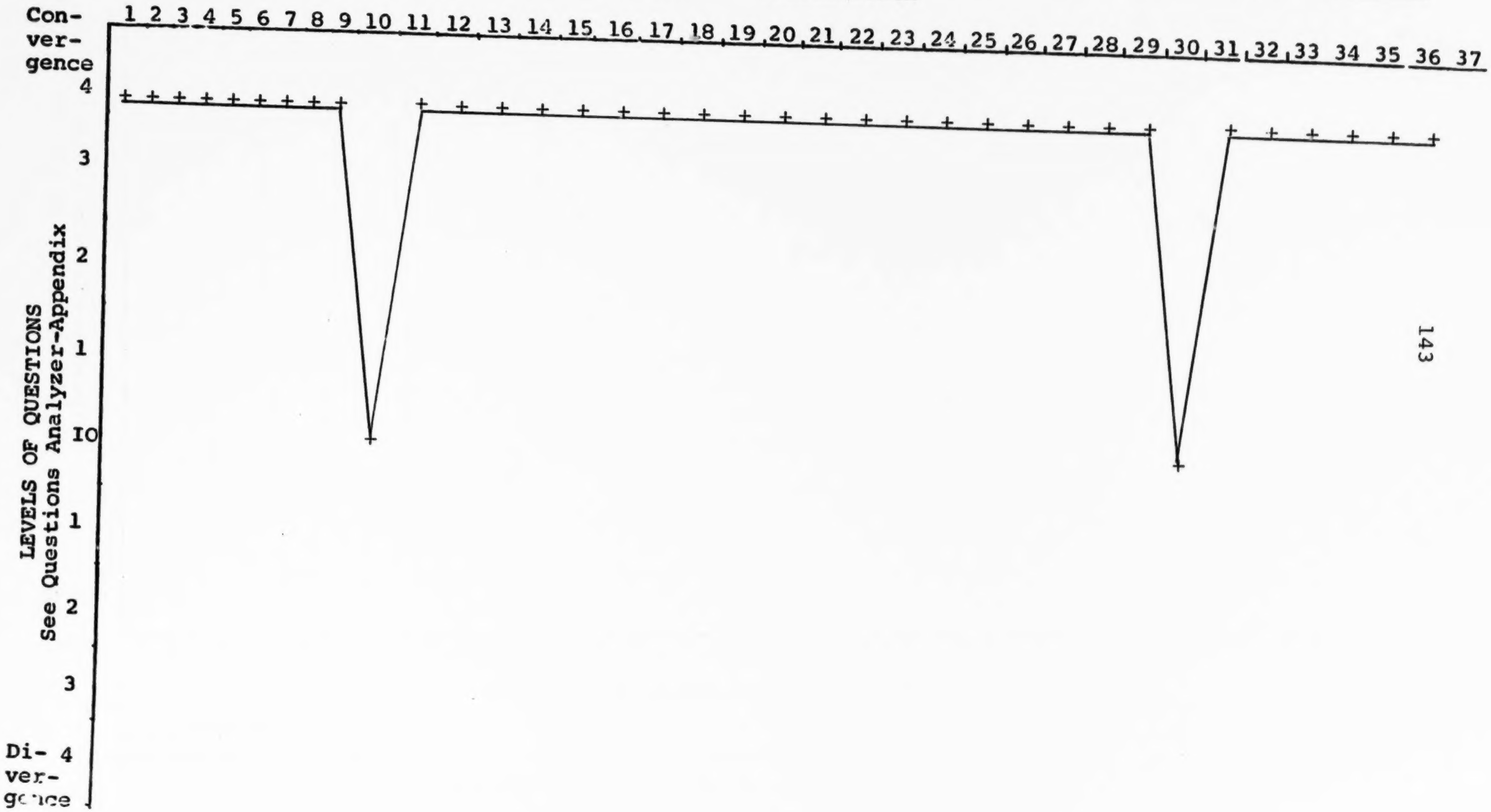
GRAPHIC PRESENTATION OF TAPE ANALYSIS

Teacher # 26
Grade 5

Time 11.0

Tape analysis #1 0
Tape analysis #2 X
Tape analysis #3 +

Questions by Order of Presentation



GRAPHIC PRESENTATION OF TAPE ANALYSIS

Teacher #28
Grade 5 & 6

Time 5.7

Tape analysis #1 0
Tape analysis #2 X
Tape analysis #3 +

Questions by Order of Presentation